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Tongass
National Forest

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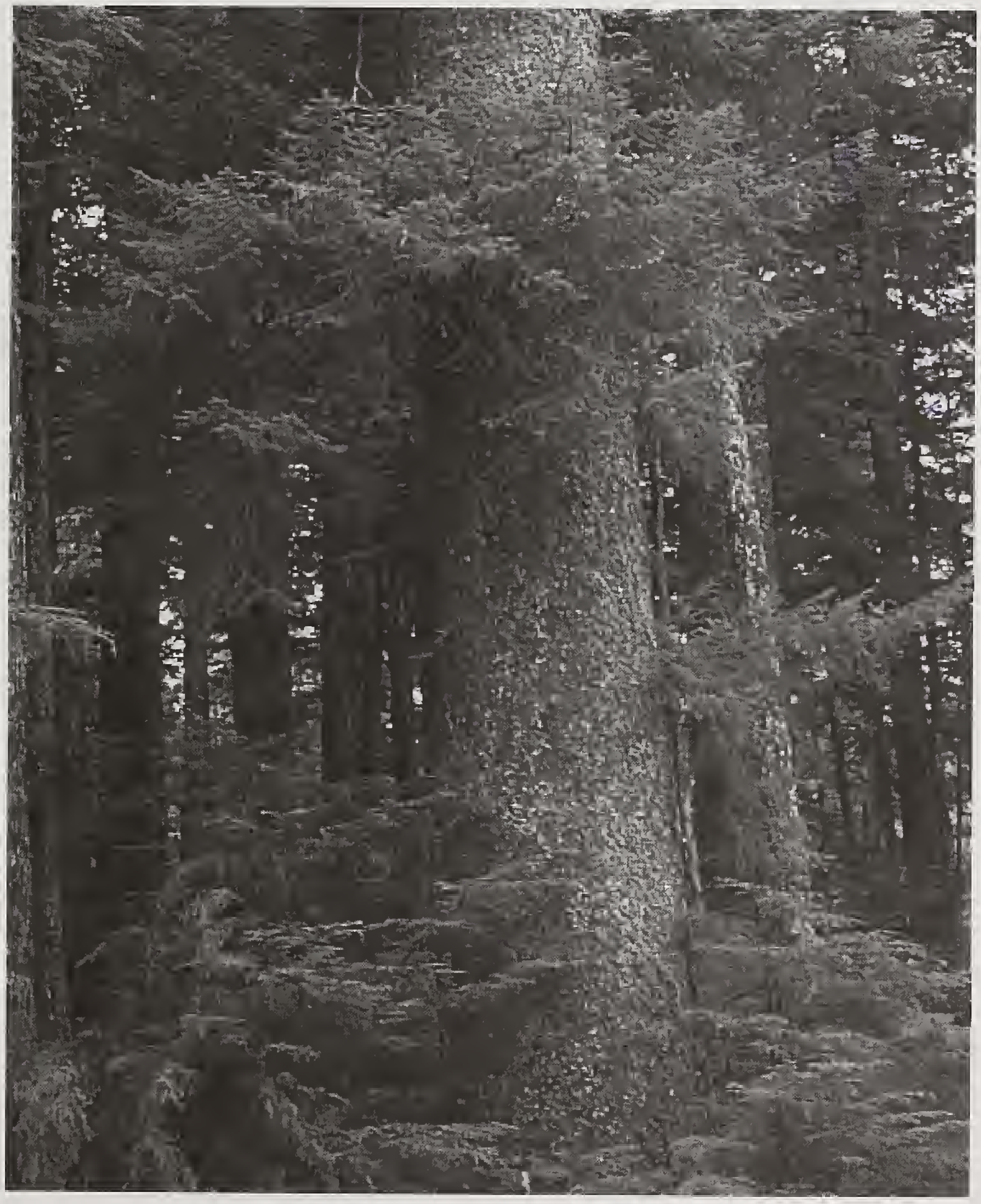
Tongass National Forest

Annual Monitoring & Evaluation Report for Fiscal Year 2001



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File Code: 1920-1-3
Date: May 22, 2002

Dear Reader,

Enclosed is the Monitoring & Evaluation Report for the Tongass National Forest for fiscal year 2001. This reports Tongass National Forest monitoring, as specified in Chapter 6 of the Tongass Land and Resource Management Plan (Forest Plan). Monitoring and evaluation are quality control processes for implementation of the Forest Plan. Information detailing implementation, effectiveness, and validation monitoring, as directed through the Forest Plan, is provided through this monitoring and evaluation report. Monitoring and evaluation comprise essential feedback mechanisms to ensure the Forest Plan is responsive to changes. The evaluation process provides feedback that identifies the necessity for corrective action.

This monitoring and evaluation report relates the Tongass National Forest status relative to the Forest Plan strategic goals. The report is organized into three chapters followed by appendices. The first chapter provides an overview of the past, present, and desired conditions for the Forest. This chapter was developed utilizing the Montreal Process Criteria as a framework. The second chapter specifically addresses the monitoring questions defined in the Forest Plan. Detailed monitoring results and specific evaluation are provided for each monitoring question. The third chapter relates the status of the Forest relative to the Forest Service Strategic Plan. This chapter provides a synthesis of the monitoring evaluations and action plans for resource management to ensure focus toward Forest Service goals.

This report summarizes specific monitoring that was completed during fiscal year 2001. We are continuing to work to complete some of our monitoring protocols. The report includes status updates and action plans for these protocols. Some of this monitoring was completed for activities that were conducted prior to the implementation of the Revised Forest Plan.

The mailing list for distribution of this report is updated each year based on receipt of response forms provided in the report (see next page). Please fill out the mail request form to notify us if you would like to receive future Tongass Monitoring and Evaluation reports. Persons or groups not responding will be deleted from the mailing list.

Additional copies of the Annual Monitoring and Evaluation Report are available from the Tongass National Forest from the Ketchikan Supervisor's Office. Please contact me at 907-747-4329 or Carol Seitz Warmuth at 907-228-6341 with questions or requests for additional copies.

Please fill out the mail request form to notify us if you would like to receive future Tongass Monitoring and Evaluation reports.

Sincerely,

Fred S Salinas

FRED S. SALINAS
Deputy Forest Supervisor

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Dear Reader,

Your name is currently on our mailing list of those who are to receive the Tongass National Forest Annual Monitoring & Evaluation Report. If you would like to receive the fiscal year 2002 report, which we will publish and mail in the spring of 2003, please mark the appropriate blank below and return this form to our office by June 30, 2002.

This letter will serve as a Response Form for our mailing list. It includes a return address on the reverse side. Please tear out, fill in the information below, and return to our office in Sitka, Alaska.

You may also fax this form to Carol Seitz Warmuth at 907-228-6341, or e-mail a reply to cseitzwarmuth@fs.fed.us.

Please note that persons or groups not returning this form will be deleted from the mailing list, and will no longer receive copies of the monitoring report.

Sincerely,

FRED S. SALINAS
Deputy Forest Supervisor

Fold

Stamp

USDA Forest Service
Tongass National Forest
Federal Building
Ketchikan, AK 99901-6591

Attn: Carol Seitz Warmuth

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TEAR OUT AND RETURN

Tongass National Forest

Annual Monitoring & Evaluation Report for Fiscal Year 2001

U. S. Department of Agriculture, Forest Service
Tongass National Forest
Ketchikan, Alaska

May 2002

Table of Contents

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Chapter 1

Setting the Context

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Introduction

Chapter 1 is an overview of the past, present and desired conditions, in the context of the 1995 Montreal Process (MP) Criteria and Indicators (C&I) of sustainable management. The criteria relate specifically to forest conditions and functions, and to the values and benefits associated with the environmental and socio-economic goods and services provided by the forests.

It is essential that planners focus on sustainability, and that our uses of the forests today do not impair the functioning of ecological processes and the ability of these natural resources to contribute economically and socially into the future. 36 CFR 219.11 states "[The] annual monitoring and evaluation report … must include … (3) A description of the trend(s) toward achieving goals or desired conditions…" It further states that achievement of ecological, social and economic sustainability is the overall goal for management of National Forest System land.

The forest planning regulations (36 CFR 219) are designed to address and help ameliorate problems associated with a highly fragmented environment. The Montreal Process seven criteria and indicators (C&I) framework provides a common language and unified measurement for improved communications between the various partners, and enables integration of social, economic and ecological factors into indicators of sustainability. The C&I do not substitute for, or undermine, the following laws and regulations, but are to be viewed as a "face" for sustainability and as a means of organizing large amounts of information.

The Montreal Process Criteria and Indicators are related to Tongass National Forest monitoring activities through the forest planning regulations (36 CFR 219), the October 2000 Forest Service Strategic Plan, and the Local Unit Criteria and Indicator Development (LUCID) project. The Tongass National Forest Land and Resource Management Plan (Forest Plan) and the Monitoring and Evaluation (M&E) Plan establish the strategic monitoring framework for the Tongass.

The C&I have seven criteria that address various elements of sustainability of forested lands. The criteria are:

I. Conservation of biological diversity
II. Maintenance of productive capacities of ecosystems
III. Maintenance of forest ecosystem health and vitality
IV. Conservation and maintenance of soil and water resources
V. Maintenance of forest contribution to global carbon cycles
VI. Maintenance and enhancement of multiple socio-economic benefits to meet the needs of societies
VII. Legal, institutional and economic framework for forest conservation and sustainable management

Description of Past and Present Management, and the Desired Condition

The discussion for each of the seven criteria is presented in three parts. The "Past" describes the historic perspective of management on the Tongass National Forest. The history of Tongass National Forest management is briefly described below, giving a general reference point for the discussion for each of the criteria.

The "Present" generally describes the current management direction and conditions. This can be related to the criteria through the Goals and Objectives for each of the 19 land use designations (LUD) in the Forest Plan.

The "Desired Condition" describes the future management condition desired for each of the 19 LUDs. In addition, desired conditions are somewhat embedded in the Forest-wide standards and guidelines (S&G) in that the standards and guidelines are developed to protect or create a specific condition. The Desired Condition for each of the 19 LUDs is described in Table 1-1. The discussion for each Criteria and Indicator will not include the complete description of each of the Desired Conditions, but will list the land use designation abbreviation, which can be cross-referenced to Table 1-1 for the description.

Past Management History

The Organic Administration Act of 1897, the basis of the National Forest System, provided direction to "improve and protect" federal forest lands. The Act also affirmed the intent to provide for sustainable protection and use of the forest reserves.

The "core" of the Tongass National Forest was the Alexander Archipelago Forest Reserve, created by proclamation, as the Alexander Archipelago Forest Reserve, on August 20, 1902, by President Theodore Roosevelt. A second National Forest, the Tongass, came to life by proclamation on September 10, 1907. The Alexander Archipelago and the Tongass were combined into a single National Forest (the Tongass), totaling 6.8 million acres, on July 1, 1908. An additional 8.7 million acres was added, by the third proclamation concerning the Tongass, on February 16, 1909. The Alaska National Interest Lands Conservation Act (ANILCA) was the next (and last) major addition to the National Forest land base.

Early management on the Tongass National Forest was focused primarily on small timber sales, mining, and investigations of timber trespass. Saw mills were generally small and local in nature. Several pulp operations were started over the years, but seldom lasted long. After the creation of Glacier Bay National Park, investigations were made to include additional portions of the Tongass in the National Park System; nothing came of these efforts. One notable conservation program made as a result of these investigations was the establishment of a wildlife preserve on Admiralty Island for the protection of brown bears. In the 1950's, several long-term, large-scale timber sale contracts were created to provide for the economic growth of Southeast Alaska. Formalized management plans were generally local in nature, and very broad and generalized in content.

The Multiple-Use Sustained-Yield Act (MUSYA) of 1960 reaffirmed the principals of sustainability for the broad spectrum of natural resources found on National Forest System lands. Multiple Use Plans were developed for areas of the Tongass National Forest, but were, again, fairly local in nature and fairly general. The National Environmental Policy Act of 1969 led to environmental assessments that addressed the environmental effects on ecological systems and natural resources. The passage of the National Forest Management Act of 1976 (NFMA), which amended the MUSYA, directed that forests develop land and resource management plans that provided for multiple uses and sustained yield in accordance with the MUSYA. In addition, consideration of environmental components such as ecosystems and biological diversity were to be provided for in forest and project planning.

The immediate direct result of the NFMA was the development of the Tongass Land Management Plan (1979), the first completed forest resource plan in the nation. The 1979 TLMP was a basic plan that established four land use designations with broad management direction. Two of the land use designations identified very large areas to be managed in an unroaded condition (areas recommended for Wilderness designation, including the two National Monuments proclaimed in 1979, and areas to be managed to preserve primitive conditions). One element established in the 1979 TLMP was a monitoring plan. The Alaska Regional Guide (1980) established specific standards and guidelines and other

management direction for National Forest management. The direction in the Regional Guide better described the measures to be taken for the protection and management of the Tongass National Forest.

The Alaska National Interest Lands Conservation Act [ANILCA] (1980) transferred large blocks of other federal agency lands to the Tongass National Forest, established 14 Wilderness Areas, and Congressionally affirmed the establishment of two National Monuments. These wildernesses were established to preserve unique ecosystems, assuring sustainability of the biological diversity found within these areas. The TLMP was amended in 1986 to incorporate these changes, as well as incorporate the direction in the Regional Guide.

The Tongass Timber Reform Act of 1990 (TTRA) amended the ANILCA, providing for additional protection of fish-producing streams, establishing five new wildernesses, and establishing 12 "LUD II" areas, which are to be managed in an essentially unroaded, primitive state to preserve their primitive conditions. The TLMP was amended in 1991 to incorporate the direction contained in the TTRA.

When the Tongass National Forest Land and Resource Management Plan (Forest Plan) Record of Decision (ROD) was signed in 1997, it marked the completion of the TLMP Revision. The Forest Plan included 19 land use designations (LUDs) or allocations, as well as detailed Forest-wide standards and guidelines for the management of the Tongass. Among the 19 land use designations allocated in the Forest Plan were Old-growth Habitat, Special Interest Areas, and Remote and Semi-remote Recreation. These allocations are intended to preserve the ecological characteristics of the areas, and to promote biodiversity through maintaining a mixture of habitats, at a variety of spatial scales, that are capable of supporting naturally occurring flora, fauna, and ecological processes. In addition, there are 22 sets of Forest-wide standards and guidelines that provide direction for the management of the Tongass National Forest. These include standards and guidelines for the management of air, beach and estuary fringe, riparian areas, soil and water, wetlands, and threatened, endangered and sensitive species.

A new Record of Decision was issued in 1999. In addition to the areas previously identified for "low impact management," the 1999 ROD established 18 "areas of special interest" to be managed in a primitive condition. These areas were either in the Remote or Semi-remote LUDs.

During continued litigation of the 1997 Forest Plan decision, the United States District Court, District of Alaska, issued a ruling on March 30, 2001 that vacated the 1999 Record of Decision. The court ruling returned the Tongass National Forest to the 1997 Forest Plan decision. The court-issued order was effective immediately.

Montreal Process Criteria and Indicators

I. Soil Disturbance Effectiveness Monitoring

Evaluation of biological diversity is achieved through examining ecological integrity. Ecological integrity is maintained through ecosystems diversity, species diversity, and genetic diversity at various spatial scales. Ecosystems diversity is evaluated in terms of vegetation types, vegetative structural classes, and protected areas, as well as habitat fragmentation/connectivity. Evaluation criteria for species and genetic diversity include the presence of selected and sensitive species/guilds, population size, population trends, and reproductive success of indigenous species. Wilderness, National Monument, old-growth reserves, wild and scenic rivers, and Special Interest Areas, as well as beach, estuary, and riparian buffers are maintained to protect rare, unique and representative species and features. This protection provides for both species and genetic diversity. Wildlife and fish species of special interest, including Management Indicator Species (MIS) and sensitive species, are monitored for population trends relative to habitat changes. The effect of fragmentation and connectivity on wildlife and fish species is determined by the relative locations of roads and harvest units to geomorphic and vegetative features. The presence of snags and in-stream coarse woody debris determine the effectiveness of the riparian buffer and stream channel condition on the maintenance of aquatic biological diversity.

1. Past

Past management activities were not necessarily designed to meet the objectives of this criteria. However, the vast area associated with the Tongass contributed heavily to the maintenance of the natural biodiversity; less than ½ of 1 percent of the total area has had any type of management activity. Management activities generally conformed to the applicable laws and regulations, but until the NFMA and the1979 TLMP, no formal Forest-wide consideration of maintaining or improving biodiversity occurred.

2. Present

Since 1979, the 1979 TLMP, the 1980 Regional Guide, the 1990 amendment incorporating the Tongass Timber Reform Act, and the direction in the 1997 Forest Plan ROD have guided management activities.

3. Desired Condition

See Table 1-1 below: WW, WM, NM, RA, SA, RM, MW, OG, SM, L2, WR, SR, RR, EF, SV, ML, and TM

II. Maintenance of Productive Capacity of Forest Ecosystems

Productive capacity of forest ecosystems is achieved through maintaining ecosystem integrity and productivity of timber. It is evaluated in terms of the timber land base, forest type and age class, annual timber removal, and presence of invasive species detrimental to forest conditions. Evaluation criteria for productive capacity include distribution and changes in the timber land base, mean annual increment for forest type and age class, rate and total area of forest land converted to non-forest cover, area/volume of annual periodic timber removal, and area and severity of occurrence of exotic species detrimental to forest condition.

1. Past

The principle management activity that relates to this criterion is timber harvest. From the 1950's to the 1990's, the vast majority of timber harvest was associated with the long-term timber sales; the only silvicultural system applied was clearcutting. Regeneration was almost entirely natural, and some precommercial thinning occurred. Major changes in timber sale planning began to come about in the 1970's with the passage of the NEPA and NFMA. Direction contained in the 1979 Forest Plan and Regional Guide changed both the ways of planning timber sales and the protection of other resources. Beginning in the 1980's, more emphasis was put on thinning and more thought given to future second growth management. The advent of the TTRA and the 1997 Forest Plan considerably changed the way the timber resource was managed. As stated above, less than ½ of 1 percent is under any type of intensive management.

2. Present

Current management of the timber resource on the Tongass National Forest is dramatically different from even ten years ago. More emphasis is put on alternative silvicultural systems with an increasing emphasis on uneven-aged management, increased second growth management, consideration for non-timber resources, and coordination with other agencies and the public.

3. Desired Condition

See Table 1-1 below: SR, RR, SV, ML, TM, and MM

III. Maintenance of Forest Ecosystem Health and Vitality

Ecosystem health and vitality is achieved through maintaining ecosystem integrity relative to selected physical and biologic indicators. Ecosystem health and vitality is evaluated in terms of principal ecological processes, effects of human activities, fire-water flow regimes, and invasion of noxious species. Evaluation criteria for ecosystem health and vitality include area and severity of insect attack and disease infestation, area of windthrow, area burned, and introduction of exotic species detrimental to forest condition, as well as the total area of forest land converted to non-forest land cover and uses, and the rate of conversion.

1. Past

Past management for forest health was primarily the salvage of windthrown or landslide/avalanche damaged trees. Wind damage is far more prevalent in Southeast Alaska than fire; fire is not a consideration. Wind damage has occurred to both natural stands and buffers left along streams, between units; many of these areas were not treated because of access or low value. Landslides are another naturally occurring destructive force; salvage rarely occurred on landslide areas because of the potential for additional soil and watershed damage. Insect and disease damage was not generally of a concern because of the relatively small area affected. Some treatment of easily accessible stands has occurred, but usually endemic levels of insect and disease activity were allowed to run their course. Insects were generally weather controlled, and outbreaks short-lived. Decays have caused small-scale disturbances, but treatment of these stands usually occurred only where readily accessible.

2. Present

Management of forest health is little changed from the past. A major shift has been in the recognition of wind damage potential, and greater effort has been put into preventing wind damage caused by management activities. Although there has been a general increase in accessibility over the Tongass, the increase in “no harvest” land use designations, the lessening emphasis on timber harvest, and the closing of existing roads will likely reduce access in the future. Natural phenomenon will be observed, but in all probability little insect- and disease-related management activity will occur.

3. Desired Condition

See Table 1-1 below: WW, WM, NW, RA, SA, RM, MW, OG, SM, L2, WR, SR, RR, EF, SV, ML, TM

IV. Conservation and Maintenance of Soil and Water Resources

Conservation and maintenance of soil and water resources is achieved through maintaining ecosystem integrity relative to estimates of historical ranges of variability of ecological conditions. Evaluation of the conservation and maintenance of soil and water resources includes the percentage of harvested area showing degraded soil quality, ecologically sensitive areas along buffer zones, and assessment of changes in the distribution and abundance of native aquatic fauna. Soil quality parameters monitored include compaction, displacement, erosion, water ponding, and loss of organic matter. Specific measurements include stream flow characteristics and acres by watershed condition, defined through hydrologic condition assessment.

1. Past

   Past management activities, particularly timber harvest and road construction, have adversely affected the soil and water resource. Changes in thinking over the years have led to an improvement of these resources. The NEPA and NFMA legislated changes in the way business was done, and greater effort was put into protection and rehabilitation of the soil and water resources. The Regional Guide contained specific standards and guidelines for the protection of the watershed resources. The Clean Water Act mandated the use of Best Management Practices (BMP), which were incorporated into the timber sale contract, and applied to road construction as well as mining activities. The passage of the TTRA directly affected the aquatic resource on the Tongass through the mandated increase in the size of riparian buffers.

2. Present

   Present management activities are heavily oriented toward the maintenance and improvement of the soil and water resources. The continuing use of the BMPs, the application of the Forest Plan standards and guidelines, the increased coordination with soil and water related agencies, and the increased use of watershed assessments have strongly contributed to a great reduction of adverse effects on the soil and water resources as a result of management activities. In addition, much more emphasis is placed on watershed restoration and rehabilitation.

3. Desired Condition

   See Table 1-1 below: WW, WM, NW, RA, SA, RM, MW, OG, SM, L2, WR, SR, RR, EF, SV, ML, TM

V. Maintenance of Forest Contribution to Global Carbon Cycles

The maintenance of a Forest's contribution to the global carbon cycle is based on the total forest ecosystem biomass and carbon pool; determined by forest type, age class and successional stages. This includes absorption and release of carbon and the contribution of forest products to the total global budget.

Carbon cycle contributions by the Tongass National Forest are not evaluated in this report.

VI. Maintenance and Enhancement of Long-Term Multiple Socioeconomic Benefits

Maintenance and enhancement of long-term multiple socioeconomic benefits is achieved through maintaining a sustainable yield and production of goods and services, and maintenance of social values. Maintenance and enhancement of socioeconomic benefits are evaluated in terms of demographics, opportunities to provide socioeconomic benefits to communities, financial benefits to communities, financial and opportunity cost, as well as the presence of natural resources and capital investment. Specific aspects tracked include production and consumption, recreation and tourism, investment in the forest sector, cultural/social/spiritual needs/values, and employment and community needs. Criteria for evaluation of the maintenance and enhancement of long-term multiple socioeconomic benefits include area/volume of timber removed, expenditures by individuals on non-timber use, availability and use of recreational opportunities, funding for forest management and research, harvest revenues, protection of unique or significant aboriginal social, cultural or spiritual sites, employment of local populations in forest management, number of communities with a significant forestry component in the economic base, area of land available for subsistence opportunities, and providing potable water sources.

1. Past

The tourism industry was started early in Southeast Alaskan history. For example, the first cruise ships visited Hubbard Glacier, near Yakutat, in 1883 and the cruise industry grew dramatically in the early years of the twentieth century. A thriving industry was built around the commercial sale of contemporary Native Alaskan artifacts. Tourism has continued to grow ever since and is intimately tied to the Tongass National Forest. The sheer presence of the forest is a major draw for tourists, ranging from cruise ships to hikers in the wilderness areas and users of Forest Service cabins. The fish, originating in the waters within and adjacent to the Tongass National Forest, are a significant attraction for tourists, creating a viable industry in charter boating. The boom in eco-tourism has increased the importance of tourism to the Southeast Alaska economics base.

Since the Tongass was established, recreation opportunities have continued to grow and are as varied as kayak trips, hiking, camping, hunting, birding, off-roading, boating, snowmobiling, and camping at Forest Service facilities including cabins, shelters, and developed recreation areas. The presence of the several wilderness areas attracts many people each year. Several businesses are based on both terrestrial and aquatic wildlife viewing, ranging from brown bears to birds to whales.

Commercial fishing has long been a feature of the economic base in Southeast Alaska. Many of the fish caught originated in the waters of the Tongass or are present because of habitat enhancement programs on the Forest. There were many fish processors located throughout Southeast Alaska with some very large canneries. These processors and canneries existed from the late 1800's to the present, although the numbers have diminished over the years. The numbers of commercial fishing boats operating in Southeast Alaska have increased over the years with a dramatic increase over the last 10 years.

In the early years of the twentieth century, there were hopes for a pulp mill operation because of the suitability of the timber for making pulp. In 1920, a series of sales were studied; this led to two

of the sales being offered in 1921. Ultimately, both failed, and a third company lost interest. The large cost of transport to available markets was the primary factor. Other pulp and sawtimber sales made in the late 1920's failed because of the onset of the Great Depression. Most early saw mills were generally small and local in nature. Many of the same problems (cost of transport, lack of an infrastructure, and a lack of local markets) have persisted throughout the years.

The 1950's brought several long-term, large-scale timber sale pulpwood/sawlog contracts, which were created to provide for the economic growth and community stability of Southeast Alaska. There were originally five contracts, which were eventually reduced to two. Ketchikan Pulp Company was formed by a combination of American Viscose and Puget Sound Pulp and Timber in 1948. A mill site was selected at Ward Cove near Ketchikan and a 50-year contract was signed in 1951. A second pulp mill was built in Sitka by the Alaska Pulp Development Company and went into operation in 1959. Timber harvesting was maintained at a relatively constant level until the early 1990's; it has since been greatly reduced through a variety of factors, including major changes in the management of the Tongass National Forest.

The long-term contract with Alaska Pulp Company was terminated in 1993. The other long-term contract with Ketchikan Pulp Corporation terminated in 1999. The mill closures brought about many social and economic effects in Southeast Alaska. Among these were reductions in property tax bases, reductions in school enrollments, and major shifts in the private sector employment with tourism and fishing taking on a much larger role. While surveys show that the average wage has remained close to the same as before the mill closures, they also show that more people are required to work two jobs to maintain the same level of pay. A much larger percentage of the employment is in the service industries and federal, state and local governments.

2. Present

The present situation continues to place less emphasis on the consumptive use of forest products, such as timber and minerals extraction, and more on the fishing and tourism industries. The timber industry, at present, is in a slump; the possibility of further reductions in the federal timber management program may reduce the industry to a position of only local effect and interest. The probability of timber once again becoming a "major player" in the overall socioeconomic environment in Southeast Alaska is considered low. Mining is becoming more important than it was just a few years ago; however, the economic effects are fairly localized. Greater emphasis is put in recreation, tourism, cultural uses of the land, and cooperative efforts to develop alternative uses of forest resources. A growing industry revolves around the culture of Native Alaskans.

3. Desired Condition

See Table 1-1 below: WW, WM, NW, RA, SA, RM, MW, OG, SM, L2, WR, SR, RR, EF, SV, ML, TM, MM, TUS

VII. Legal, Institutional and Economic Framework for Forest Conservation and Sustainable Management

Effectiveness of the legal, institutional and economic framework for forest conservation and sustainable management is determined through evaluation of the support toward conservation and sustainable management of the forest, economic policies and measures, capacity to measure and monitor changes in conservation and sustainable management, and capacity to conduct and apply research/development focused on improving forest management and delivery of goods/services. Evaluation criteria for the application of the legal, institutional and economic framework for forest conservation and sustainable management include: access to forest resources, ownership, effectiveness of inter-institutional coordination on land use and forest management, performance accomplishment, effective monitoring and control system audits for management conformity with planning, harvest system prescriptions, mechanisms for sharing the economic benefits derived from forest management, relevance of policy and planning information, and status of inventories relative to updates.

1. Past

The legal framework for forest conservation and sustainable management is rooted in the very beginnings of the Forest Reserves. The Creative Act of 1891 withdrew the forest reserves from the public domain. The purpose of the forest reserves was to protect and manage the forest resources for sustained production of goods and services into the future. In 1897, the Organic Act established the national forests, and gave direction to "improve and protect" federal forest lands.

Four key pieces of legislation guide the management of the Tongass National Forest and the sustainability of forest resources. The first is the Multiple Use-Sustained Yield Act of 1960. The MUSYA affirmed the authority of the Forest Service to manage the national forests and grass lands for "outdoor recreation, range, timber, watershed, and wildlife and fish purposes..." Through this Act, Congress affirmed the philosophies and principles of sustainability to all the resources under the management and responsibility of the Forest Service.

The second is the National Environmental Policy Act of 1969 (NEPA), which was enacted to "promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man" and "enrich the understanding of ecological systems and natural resources." The NEPA directs that for all federal actions that significantly affect the quality of the human environment, document the environmental effects of the action and display and evaluate alternatives to proposals.

The third is the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA). The RPA called for a five-year review of all Forest Service activities, based on an assessment of renewable resources completed every 10 years.

The RPA was amended with the National Forest Management Act of 1976 (NFMA), the fourth key law. The NFMA mandated the use of land management plans to guide the management of the national forests in a manner that provides for multiple use and sustained uses. The plans were to be developed and maintained through "integrated consideration of physical, biological, economic and other sciences."

Management of the Tongass was directly affected by passage of the Alaska National Interest Lands Conservation Act of 1980. The ANILCA increased the size of the Tongass National Forest, established 14 Wilderness Areas, and affirmed the establishment of two National Monuments. These wildernesses and monuments were established to preserve unique ecosystems, assuring sustainability of the biological diversity found within these areas. In addition, the ANILCA directs that, consistent with good management principles and conservation practices, activities on [federal] public lands in Alaska will be conducted to cause the least effect on the subsistence lifestyles of Alaskan rural residents. The Tongass Timber Reform Act of 1990 (TTRA) amended the ANILCA, providing for identification of lands unsuitable for timber

management, increasing protection of fish-producing streams, establishing five new wildernesses, and establishing 12 "LUD II" areas, which are to be managed in an essentially unroaded state to preserve their primitive conditions.

Many other laws have been passed to protect, maintain or enhance all of the forest resources, including the social and cultural resources. These laws include:

Weeks Law of 1911 – authorized the purchase of lands within the watersheds of navigable streams;

Knutson-Vandenberg Act (1930) – authorized the collection of funds from timber sale receipts for the purpose of "protecting and improving the productivity of the renewable resources of the forest land ... including sale area improvement, maintenance and construction, reforestation, and wildlife habitat management";

Clean Water Act of 1948, as amended – provided for a variety of measures to preserve water quality, including the mandate to develop Best Management Practices;

Wilderness Act of 1974 –established the national wilderness preservation system for the purpose of "...preserving relatively large tracts of land which appear unaffected by human activity, has outstanding opportunities for solitude or a primitive type of recreation, and may contain ecological, geological, or other features of scientific, educational, scenic, or historic value";

National Historic Preservation Act (1966) – required Federal agencies to take a bigger role in historic preservation programs and activities;

Wild and Scenic Rivers Act (1968) – declared that selected rivers which possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or similar values be preserved in their free-flowing state;

Endangered Species Act of 1973 (ESA) – directed that Federal agencies "shall seek to conserve threatened and endangered species";

Archaeological Resources Protection Act of 1979 – directed Federal agencies to protect archaeological and cultural resources and sites on [federal] public lands;

Federal Cave Resources Act of 1988 – provided for protection of significant cave resources on Federal lands; and

Forest Stewardship Act of 1990 – established a grant program for the study of biology of forest organisms, ecosystems functions, and wood as a raw material, among others. Also provided increased service to rural communities through rural development programs.

In addition to the myriad of laws, other national direction comes from Executive Orders. Executive Orders of interest that address protection and maintenance of forest resources (such as natural, socioeconomic and cultural resources) include EO 11988 Floodplain Management (1977), EO 11990 Protection of Wetlands (1977), 12898 Environmental Justice (1994), EO 12962 Recreational Fisheries (1995), and EO 13186 Migratory Bird Protection (2000).

The various regulations, manuals, and handbooks provided the management philosophies, polices, principles, and direction for the implementation of the laws and Executive Orders.

2. Present

The present management is to continue to follow all applicable laws, Executive Orders, and regulations in the management of the Tongass National Forest, and to continue to make adaptive changes to integrate laws and regulations as they become effective.

3. Desired Condition

The legal framework for management of the forest resources of the Tongass National Forest applies across the full spectrum of resources. The Desired Conditions for all land use allocations are tied to this legal framework, and will conform to the applicable laws, regulations, policies, and direction.

Table 1-1. Relationship between Forest Plan Desired Conditions and Criteria Indicators

Desired Condition	Criteria Indicators						
	Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
WW, WM - Wilderness, Wilderness National Monument Extensive, unmodified natural environments characterize all designated Wilderness on the Tongass National Forest. Ecological processes and natural conditions are not measurably affected by past or current human uses or activities. Users have the opportunity to experience independence, closeness to nature, solitude and remoteness, and may pursue activities requiring self-reliance, challenge and risk. Motorized and mechanized use is limited to the minimum needed for the administration of the wilderness, access to state and private lands, subsistence uses, and for public access and other uses specifically allowed by ANILCA. The purposes of National Monument designation are fulfilled by protecting and learning more about the special resources they contain. Appropriate research is encouraged and supported within the constraints of wilderness designation, and contributes to both the purposes of the Wilderness National Monuments and improved management of other forest lands. Appropriate interpretive and educational efforts allow the public to better understand the resources of these special areas and to appreciate how these areas fit into the local, regional, and even global context of geology, ecology, and human history. The Wilderness portions of Admiralty Island and Misty Fiords National Monuments have the same characteristics and desired conditions as other Wildernesses on the Forest.	X		X	X		X	
NW - Nonwilderness National Monument The purposes of the Nonwilderness National Monument designation is the same as that for the Wilderness. Ultimately, the entire Nonwilderness National Monument provides the same natural settings and recreation experiences as the adjacent Wilderness National Monument areas. However, activities, such as mining, are permitted that are not allowed in Wilderness. During mining operations, mining activities are localized and limited to the area necessary for their efficient and orderly development. Off-site effects to National Monument resources are minimal, and most Monument users are not aware of, or affected by, the mines. After the completion of mining, rehabilitation of the affected areas is done to minimize the evidence of past mining and to the maximum extent feasible, seek to return the area to generally natural conditions.	X		X	X		X	

Desired Condition	Criteria Indicators: Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
RA - Research Natural Area All Research Natural Areas on the Tongass National Forest are characterized by essentially unmodified environments in which natural ecological processes prevail. They remain undisturbed by human uses or activities, and provide quality opportunities for non-manipulative scientific research, observation and study. The RNA network is representative of the predominant vegetation types, wildlife habitats, and aquatic communities of the Tongass. Research Natural Areas are used as monitoring reference areas to evaluate other lands where management activities are undertaken to assess the effectiveness of various standards, guidelines, and mitigation measures in reducing or preventing adverse environmental effects.	X		X	X		X	
SA - Special Interest Area All Special Interest Areas on the Tongass National Forest are characterized by generally unmodified environments in which unique natural features are preserved. They remain largely undisturbed by human uses or activities, except for localized interpretive purposes and, in some cases, recreation developments, and provide quality opportunities for public study, use, and enjoyment. Each is an example of one or more cultural, geological, botanical, zoological, paleontological, or other special features unique within the Tongass.	X		X	X		X	
RM - Remote Recreation Areas in the Remote Recreation Land Use Designation are characterized by extensive, unmodified natural environments. Ecological processes and natural conditions are not noticeably affected by past or current human uses or activities. Users have the opportunity to experience independence, closeness to nature, solitude and remoteness, and may pursue activities requiring self-reliance in an environment that offers a high degree of challenge and risk. Interactions between users are infrequent. Motorized access is limited to traditional means: boats, aircraft and snowmachines. Facilities and structures are minimal, and rustic in appearance.	X		X	X		X	
MW - Municipal Watershed Lands managed as Municipal Watersheds are generally in a natural condition. Facilities or structures to provide municipal water supplies may be present. Uses or activities that could adversely affect water quality or supply do not occur. These watersheds provide municipal water that meets all State Drinking Water Regulations and Water Quality Standards for water supply.	X		X	X		X	

Desired Condition	Criteria Indicators						
	Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
OG - Old-growth Habitat All forested areas within this Land Use Designation have attained old-growth forest characteristics. A diversity of old-growth habitat types and associated species and subspecies and ecological processes are represented.	X		X	X		X	
SM - Semi-remote Recreation Areas in the Semi-remote Recreation Land Use Designation are characterized by generally unmodified natural environments. Ecological processes and natural conditions are only minimally affected by past or current human uses or activities. Users have the opportunity to experience a moderate degree of independence, closeness to nature, solitude and remoteness, with some areas offering motorized opportunities and others non-motorized opportunities (except for the traditional uses of boats, aircraft, and snowmachines). Interactions between users are infrequent. Facilities and structures may be minimal or occasionally may be larger in scale, but will be rustic in appearance, or in harmony with the natural setting.	X		X	X		X	
L2 - Land Use Designation II Areas in this Land Use Designation are characterized by extensive, generally unmodified natural environments, and retain their wildland character. Ecological processes and natural conditions are only minimally affected by past or current human uses or activities. Users have the opportunity to experience a high-to-moderate degree of independence, closeness to nature, solitude, and remoteness and may pursue activities requiring self-reliance, challenge, and risk. Interactions between users are infrequent. Recreational facilities and structures are primitive.	X		X	X		X	
WR - Wild River Wild Rivers and river segments are in a natural, free-flowing, and undisturbed condition. Ecological processes and changes predominate. The outstandingly remarkable values for which the river was designated remain outstanding and remarkable. Recreation users have the opportunity for primitive and semi-primitive experiences, solitude, and remoteness in a natural setting. Interactions between users are infrequent, and evidence of human activities is minimal. Facilities and structures are rustic in appearance and promote primitive recreation and tourism experiences.	X		X	X		X	

Desired Condition	Criteria Indicators						
	Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
SR - Scenic River Scenic Rivers and river segments are in a generally unmodified, free-flowing condition. Ecological processes and changes may be somewhat affected by human uses. The outstandingly remarkable values for which the river was designated remain outstanding and remarkable. Recreation and tourism users have the opportunity for experiences ranging from Primitive to Roaded Natural in a natural-appearing setting. Resource activities within the river corridor are not visually evident to the casual observer. Interactions between users are moderate. Facilities and structures are rustic in appearance, and promote semi-primitive recreation experiences and/or public safety. A yield of timber may be produced which contributes to the Forest-wide sustained yield.	X	X	X	X		X	
RR - Recreational River Recreational Rivers and river segments are in a generally unmodified to modified, essentially free-flowing condition. Ecological processes and changes may be affected by human uses. The outstandingly remarkable values for which the river was designated remain outstanding and remarkable. Recreation users have the opportunity for a variety and range of experiences in a modified but pleasing setting. Resource activities and developments may be present within the river corridor, and may dominate some areas. A variety of visual conditions occur. Interactions between users may be moderate to high. A yield of timber may be produced which contributes to Forest-wide sustained yield.	X	X	X	X		X	
EF - Experimental Forest Each experimental forest is managed for the purposes for which it was established. Ongoing research provides useful needed information for forest management. Non-research types of activities and uses may be compatible, and do not interfere with, research or demonstration objectives. Opportunities for public use of roads may be present.	X		X	X		X	

Desired Condition	Criteria Indicators						
	Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
SV - Scenic Viewshed In areas managed under the Scenic Viewshed Land Use Designation, forest visitors, recreationists, and others using identified popular travel routes and use areas will view a natural-appearing landscape. Management activities in the foreground will not be evident to the casual observer. Activities in the middleground and background will be subordinate to the characteristic landscape. Areas topographically screened from Visual Priority Travel Routes and Use Areas may be heavily modified. Within these viewsheds, timber harvest units are typically small and affect only a small percentage of the seen area. At any given point in time, roads, facilities, and other structures are either not visually evident or are subordinate to the landscape. A variety of successional stages providing wildlife habitat occur, although late successional stages predominate. Recreation and tourism opportunities in a range of settings are available. In the areas managed for Retention or Partial Retention VQO's, timber yields will generally be obtained through the use of small openings or uneven-aged systems. A yield of timber is produced which contributes to Forest-wide sustained yield.	X	X	X	X		X	
ML - Modified Landscape In areas managed under the Modified Landscape Land Use Designation, forest visitors, recreationists, and others using popular travel routes and use areas will view a somewhat modified landscape. Management activities in the visual foreground will be subordinate to the characteristic landscape, but may dominate the landscape in the middle and backgrounds. Within the foreground, timber harvest units are typically small and affect only a small percentage of the seen area at any one point in time. Roads, facilities, and other structures are also subordinate to the foreground landscape. Recreation opportunities associated with natural-appearing to modified settings are available. A variety of successional stages provide a range of wildlife habitat conditions. A yield of timber is produced which contributes to Forest-wide sustained yield.	X	X	X	X		X	
TM - Timber Production Suitable timber lands are managed for the production of sawtimber and other wood products on an even-flow, long-term sustained yield basis; the timber yield produced contributes to a Forest-wide sustained yield. An extensive road system provides access for timber management activities, recreation uses, hunting and fishing, and other public and administrative uses; some roads may be closed, either seasonally or year-long, to address resource concerns. Management activities will generally dominate most seen areas. Tree stands are healthy and in a balanced mix of age classes from young stands to trees of harvestable age, often in 40- to 100-acre stands. Recreation opportunities, associated with roaded settings from Semi-primitive to Roaded Modified, are available. A variety of wildlife habitats, predominantly in the early and middle successional stages, are present.	X	X	X	X		X	

Desired Condition	Criteria Indicators: Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
MM - Minerals During mining operations, mining activities are limited to the area necessary for their efficient, economic, and orderly development. Mining is carried out so that any effects on other resources are minimized to the extent feasible, and all minimum legal resource protection requirements are met. Other resource uses and activities in the area do not conflict with mining operations. After the completion of mining, affected areas are rehabilitated and, in most cases, the area once again provides the settings and opportunities of the original Land Use Designation.		X				X	
TUS - Transportation & Utility System Transportation and Utility Systems have been constructed in an efficient and economic manner, and have been designed to be compatible with the adjacent Land Use Designation to the maximum extent feasible. The minimum land area consistent with an efficient, safe facility is used for their development. Effects on other resources have been recognized and resource protection has been provided. Other resource uses and activities in the area do not conflict with utility operations. State and Federal highways and reservoirs offer new developed recreation opportunities, as appropriate.						X	

THE USDA FOREST SERVICE'S

Integrity and Accountability:

MISSION: To Sustain the Health, Diversity and Productivity of the Nation's Forests

GOALS

Ecosystem Health

Promote ecosystem health and conservation using a collaborative approach to sustain the Nation's forests, grasslands and watersheds.

Multiple Benefits to People

Provide a variety of uses, values, products and services for present and future generations by managing within the capability of sustainable ecosystems.

OBJECTIVES

Objective 1.a—Improve and protect watershed conditions to provide the water quality and quantity and the soil productivity necessary to support ecological functions and intended beneficial water uses.

Objective 1.b—Provide ecological conditions to sustain viable populations of native and desired nonnative species and to achieve objectives for Management Indicator Species (MIS)/focal species.

Objective 1.c—Increase the amount of forests and grasslands restored to or maintained in a healthy condition with reduced risk and damage from fires, insects and diseases, and invasive species.

Objective 2.a—Improve the capability of the Nation's forests and grasslands to provide diverse, high-quality outdoor recreation opportunities.

Objective 2.b—Improve the capability of wilderness and protected areas to sustain a desired range of benefits and values.

Objective 2.c—Improve the capability of the Nation's forests and grasslands to provide desired sustainable levels of uses, values, products, and services.

Objective 2.d—Increase accessibility to a diversity of people and members of underserved and low-income populations to the full range of uses, values, products, and services.

Objective 2.e—Improve delivery of services to urban communities.

STRATEGIC PLAN FRAMEWORK

A Framework for Natural Resource Management

Forests and Grasslands to Meet the Needs of Present and Future Generations

GOALS

Scientific and Technical Assistance

Develop and use the best scientific information available to deliver technical and community assistance and to support ecological, economic, and social sustainability.

Effective Public Service

Ensure the acquisition and use of an appropriate corporate infrastructure to enable the efficient delivery of a variety of uses.

OBJECTIVES

Objective 3.a—Better assist in building the capacity of Tribal governments, rural communities, and private landowners to adapt to economic, environmental, and social change related to natural resources.

Objective 3.b—Increase the effectiveness of scientific, developmental, and technical information delivered to domestic and international interests.

Objective 3.c—Improve the knowledge base provided through research, inventory, and monitoring to enhance scientific understanding of ecosystems, including human uses, and to support decision making and sustainable management of the Nation's forests and grasslands.

Objective 3.d—Broaden the participation of less traditional research groups in research and technical assistance programs.

Objective 4.a—Improve financial management to achieve fiscal accountability.

Objective 4.b—Improve the safety and economy of USDA Forest Service roads, trails, facilities, and operations and provide greater security for the public and employees.

Objective 4.c—Improve and integrate informational systems, data structures, and information management processes to support cost-efficient program delivery.

Objective 4.d—Improve the skills, diversity, and productivity of the workforce.

Objective 4.e—Ensure equal opportunity in employment practices.

Objective 4.f—Provide appropriate access to National Forest System lands and ensure nondiscrimination in the delivery of all USDA Forest Service programs.

Table 1-2. Tongass Monitoring Questions/ USDA Forest Service Strategic Goals Crosswalk

Tongass Monitoring Questions	*Goal 1: Ecosystem Health*	*Goal 2: Multiple Benefits to People*	*Goal 3: Scientific and Technical Assistance*	*Goal 4: Effective Public Service*
Air Quality				
Is air quality meeting State and Federal ambient air quality standards?	X			
Biodiversity				
Are contiguous blocks of old growth habitat being maintained in a forest-wide system of old growth reserves to support viable and well distributed populations of old growth associated species and subspecies?	X			
Are the effects on biodiversity consistent with those estimated in the Forest Plan?	X			
Are management practices consistent with current knowledge regarding sensitive species conservation (federally listed threatened or endangered species, Alaska Region sensitive species, and State species of special concern)?	X			
Are destructive insect and disease organisms increasing to potentially damaging levels following management activities?	X			
Fish Habitat				
Are population trends for Management Indicator Species (MIS) and their relationship to habitat changes consistent with expectations?	X			
Are fish and riparian standards and guidelines being implemented?	X			
Are fish and riparian standards and guidelines effective in maintaining or improving fish habitat?	X			
Heritage Resources				
Are heritage resources standards and guidelines being implemented?		X		
Are heritage resources standards and guidelines effective in protecting heritage/cultural resources as expected in the Forest Plan?		X		

Tongass Monitoring Questions	***Goal 1: Ecosystem Health***	***Goal 2: Multiple Benefits to People***	***Goal 3: Scientific and Technical Assistance***	***Goal 4: Effective Public Service***
Karst and Caves				
Are karst and cave standards and guidelines being implemented?	X			
Are karst and cave standards and guidelines effective in protecting the integrity of significant caves and the karst landscape?	X			
Land Management Planning				
Is the management of National Forest System lands consistent with management objectives of adjacent lands and their management plans?		X		
Local and Regional Economies				
Are the effects on employment and income similar to those estimated in the Forest Plan?		X		
Has the Forest Service worked with local communities to identify and pursue Rural Community Assistance opportunities?			X	
Minerals and Geology				
Are the effects of mining activities on surface resources consistent with Forest Plan expectations, as allowed in approved Plans of Operations?	X			
Recreation and Tourism				
Are areas of the Forest being managed in accordance with the prescribed Recreation Opportunity Spectrum (ROS) class in Forest-wide standards and guidelines?		X		
Is Off Road Vehicle (ORV) use causing, or will it cause, considerable adverse effects on soil, water, vegetation, fish and wildlife, visitors or cultural and historic resources of the Forest?	X			
Research				
Have identified high-priority information needs been fulfilled?			X	

Tongass Monitoring Questions	*Goal 1: Ecosystem Health*	*Goal 2: Multiple Benefits to People*	*Goal 3: Scientific and Technical Assistance*	*Goal 4: Effective Public Service*
Scenery				
Are the standards and guidelines effective in attaining the adopted Visual Quality Objectives established in the Plan?		X		
Soil and Water				
Are the standards and guidelines for soil disturbance being implemented?	X			
Are the standards and guidelines effective in meeting Alaska Regional Soil Quality Standards?	X			
Are Best Management Practices being implemented?	X			
Are Best Management Practices effective in meeting water quality standards?	X			
Subsistence				
Are the effects of management activities on subsistence users in rural Southeast Alaska communities consistent with those estimated in the Forest Plan?		X		
Timber				
Are timber harvest activities adhering to applicable timber management standards and guidelines?		X		
Are harvested Forest lands restocked within five years following harvest?		X		
Is the Allowable Sale Quantity (ASQ) consistent with resource information and programmed harvest?		X		
Are the Non-Interchangeable Components (NIC) of the allowable sale quantity consistent with actual harvest?		X		
Is the proportional mix of volume in NIC I and NIC II as estimated in the Forest Plan accurate?		X		
Should maximum size limits for harvested areas be continued?		X		
Transportation				
Are the standards and guidelines used for forest development roads and Log Transfer Facilities effective in limiting the environmental effects to anticipated levels?	X			

Tongass Monitoring Questions	*Goal 1: Ecosystem Health*	*Goal 2: Multiple Benefits to People*	*Goal 3: Scientific and Technical Assistance*	*Goal 4: Effective Public Service*
Wetlands				
Are wetlands standards and guidelines being implemented?	X			
Are wetlands standards and guidelines effective in minimizing the impacts to wetlands and their associated functions and values?	X			
Wild and Scenic Rivers				
Are Wild, Scenic, and Recreational River standards and guidelines being implemented?		X		
Are Wild, Scenic, and Recreational River standards effective in maintaining or enhancing the free flowing conditions and outstandingly remarkable values at the classification level for which the river was found suitable for designation as part of the National Wild and Scenic River System?		X		
Wilderness Areas				
Are standards and guidelines for the management of wilderness being implemented?		X		
Are standards and guidelines for the management of wilderness effective in maintaining the wilderness resource?		X		
Wildlife				
Are population trends for Management Indicator Species (MIS) and their relationship to habitat changes consistent with expectations?	X			
Are the population levels and associated distribution of mammalian endemic species on islands and portions of the mainland consistent with the estimates in the Forest Plan?	X			
Costs and Outputs				
What outputs were produced in the previous year?		X		
Are the costs associated with carrying out the planned management prescriptions (including those of producing outputs) consistent with those costs estimated in Plan?				X

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Chapter 2

Monitoring Results

Monitoring Results

Air Quality

Goal: Maintain the current air resource condition to protect the Forest's ecosystems from on- and off-Forest air emissions sources.

Objective: Attain national and state ambient air quality standards Forest-wide.

Background: Air quality is addressed Forest-wide, but the actual monitoring takes place at one or more monitoring sites within local air sheds where there are known or suspected air quality problems. Refer to "*Juneau Air Quality Monitoring Project, Mendenhall Valley Data Summary, January 1985 – December 1995*," published by the Alaska Department of Environmental Conservation, January 31, 1996.

Air Quality Question: Is air quality meeting State and Federal ambient air quality Standards?

The Tongass National Forest summarizes ambient air quality monitoring data the Alaska Department of Environmental Conservation (ADEC) has collected and analyzed in accordance with the Code of Federal Regulations (40 CFR Part 50). This data is stored in the Environmental Protection Agency's (EPA) Aerometric Information Retrieval System (AIRS) database, which is available to the public on the Internet at http://epa.gov/air/data/monreps.html.

ADEC's monitoring strategy is to focus its limited resources on the highest priority areas and pollutants (i.e., areas and pollutants most likely to exceed a public health standard). For Southeast Alaska, ADEC has focused its efforts on monitoring particulate matter in Juneau's Mendenhall Valley. Particulate matter less than or equal to 10 micrometers, or $PM_{10,}$ is measured in micrograms per cubic meter (ug/m^3). There are two standards for PM_{10}: $150ug/m^3$, measured as a 24-hour average; and $50ug/m^3$, measured as an annual average.

A new standard of particulate matter less than or equal to 2.5 micrometers, or $PM_{2.5,}$ is also measured in micrograms per cubic meter (ug/m^3). The two standards for $PM_{2.5}$ are: $65ug/m^3$ measured as a 24-hour average; and 15.0 ug/m^3, measured as an annual average.

Monitoring Results

During 2001, the highest reported 24-hour value for PM_{10} in the Mendenhall Valley was 28 ug/M^3, which is 19 percent of the standard. The second, third, and fourth highest 24-hour values were 24, 21, and 17 ug/m^3, respectively. The last time the PM_{10} standards in Mendenhall Valley were exceeded was in 1993, when the three highest values were 313, 224, and 169 ug/m^3.

No values for $PM_{2.5}$ were available.

Evaluation of Results

Although the Mendenhall Valley (including about 5,000 acres of Tongass National Forest land) is officially listed as a non-attainment area for PM-10, no exceedances of either PM-10 standard on or adjacent to the Tongass National Forest were reported in 2001. The City and Borough of Juneau's control strategy, including its wood smoke control program and its road paving projects, appears to be working.

Thus assuming ADEC's monitoring strategy is sound and the data stored in EPA's AIRS database is reliable, the answer to this monitoring question is: yes, air quality is meeting state and federal air quality standards.

Therefore, we recommend no corrective action with respect to air quality on the Tongass National Forest at this time. We also recommend the Tongass Monitoring Plan be amended to change the sampling methods for Air Quality from “annually summarize and evaluate available information...” to “every five years summarize and evaluate information from the State Department of Environmental Conservation and the U.S. Environmental Protection Agency.”

Biodiversity

Goal: Maintain healthy forest ecosystems; maintain a mix of habitats at different spatial scales (i.e., site, watershed, island, province, and forest) capable of supporting the full range of naturally occurring flora, fauna, and ecological processes native to Southeast Alaska.

Objective: Maintain a Forest-wide system of old-growth forest habitat (includes reserves, non-development land use designations, and beach, estuary and riparian corridors) to sustain old-growth-associated species and resources. Ensure that the reserve system meets the minimum size, spacing, and composition criteria described in Appendix K of the Forest Plan. Provide sufficient habitat to preclude the need for listing species under the Endangered Species Act due to habitat conditions on National Forest lands.

Background: Two coarse-filter approaches are used here to monitor Forest biodiversity. The first focuses on the spatial distribution and composition of old-growth reserves and the cumulative harvest of old-growth timber by Biogeographical Province. It is assumed that the GIS database will be measured using a current layer. The second examines emerging information concerning sensitive species conservation on the Forest.

Biodiversity Question 1: Are contiguous blocks of old-growth habitat being maintained in a Forest-wide system of old-growth reserves to support viable and well-distributed populations of old-growth-associated species and subspecies?

The effects of management activities on the Tongass old-growth conservation strategy were determined by reviewing project-level environmental documents and Forest Plan amendments for their effects on the spatial distribution, size, and composition of old-growth habitat reserves. This is consistent with the Biodiversity Evaluation Criteria and Sampling Methods listed in the Forest Plan.

The Interagency Viable Population Committee (VPOP) developed a landscape conservation strategy to provide old growth habitat to support well-distributed, viable populations old-growth associated wildlife species across the Tongass National Forest (Suring et al. 1993). Because of the comprehensive nature of the VPOP approach and supportive technical reviews of the strategy (see (Marcot 1992; Kiester and Eckhardt 1994), the system of VPOP large and medium habitat reserves was integrated into the Revised Forest Plan as the cornerstone of the old-growth habitat reserve strategy. The planning record provides an evaluation of how well the Tongass old-growth reserve system meets VPOP recommendations (Iverson 1997). The record found that the Forest Plan reserves exceeded the minimum amount recommended by the VPOP strategy by over 100%. Of particular interest were the five biological provinces identified by VPOP as having a higher risk of not maintaining viable populations of wildlife (Table 2-1). These higher risk provinces exceed the minimum VPOP POG recommendations by 33 to 108%.

Table 2-1. Percentage that Higher Risk Biological Provinces Exceed the Minimum VPOP Productive Old Growth Recommendations

Higher Risk Biological Provinces (higher risk relative to maintaining viable populations)	Percent Exceed Minimum VPOP Recommendations
North Prince of Wales	51%
Kupreanof/Mitkof Island	33%
Etolin Island and Vicinity	43%
East Chichagof (and east Chichagof) Island	73%
Revilla Island/Cleveland Peninsula	108%

These and other analyses at the time concluded that the strategy was sufficient. IMEG has recommended additional analyses. In FY2002, the Annual Monitoring report will contain a detailed analysis of the OGRs on the Tongass with a special emphasis on the composition and spacing of

individual OGRs. This is a timely opportunity to incorporate new information on ecological subsections (Nowacki et al. 2001) and coarse canopy forest (Caouette et al. 2000).

As directed in the Forest Plan, small OGRs are being systematically reviewed as part of individual timber sale plans. Since the signing of the Forest Plan ROD in May 1997, some project-level plans have changed the size or composition of old growth reserves. These changes are summarized in Table 2-2. None of these changes significantly changed the spacing of the reserves. To date, four other environmental documents, Indian River Timber Sale(s), Skipping Cow Timber Sale, Crane and Rowan Mountain, and Emerald Bay, did not amend OGR boundaries and are not included in Table 2-2. These OGRs met Forest Plan requirements. A road was permitted through a Medium OGR in the Emerald Bay document. This decision was reversed in an appeal.

Amendments to the Forest Plan have resulted in an increase of 12,051 acres including 5,008 acres of productive old growth (POG) within the Old-growth Habitat LUD. Old-growth habitat reserves modified in these RODs meet or exceed size and productive old-growth minimums (Appendix K, Forest Plan).

In the resolution of an appeal of the Crystal Creek FEIS (#99-10-00-0006-A15), the Forest Service agreed to display the effects of OGR modifications on the suitable available timber in the biodiversity section of the annual Forest Plan Monitoring Report. These changes are displayed in Table 2-2. Forest-wide, these modifications of OGRs have reduced the timber base available for timber harvest by 2,168 acres.

Evaluation of Results

Since May 1997, project level decisions have generally increased the size and improved composition of Old-growth Reserves.

Recommendations

1) Continue detailed descriptions of changes in OGRs and associated rationale in project-level NEPA documents.
2) Develop procedures within the GIS to make it easier to track changes in OGRs.
    a) Track all non-development LUDs within the boundary of the OGR.
    b) Code OGR by size (large, medium, small).
    c) Include the size and composition of the OGRs before and after the changes in the NEPA documents.
    d) In the FY2002 Annual Monitoring Report provide a summary of the rationale used to modify small OGRs over the past 5 years.
3) In FY2002, conduct a review of the size, spacing and composition of all OGRs. Incorporate new information on ecological subsections and coarse canopy forest.

Table 2-2. Summary of Acreage Changes in the Old-growth LUDs Documented in Project-level NEPA RODs During FY 2001 [3].

Project FY ROD Signed	VCU	5/97 OGR Acres (POG)	Guideline OGR Acres (POG)[1]	Modified OGR Acres (POG)	Net Change OGR Acres (POG)	Net Change Suitable Acres [4]	Comments
Canal Hoya 1998	5200	2,090 *(1,630)*	2,901 *(1,450)*	9,210 *(2,740)*	7,120 *(1,110)*	-151	1) Expanded to meet size requirement
Chasina 1998	6800	1,525 (537) 2	637 (318)	2,202 (842)	677 (305)	-78	1) Too small due to private lands. 2) Expanded to meet size requirement
Control Lake 1998	5972 5971	5,073 *(2,418)* [2]	3,404 *(1,702)*	4,596 *(2,359)* [2]	-477 *(-59)*	+304	1) Remove 2nd growth 2) Improve connectivity 3) Includes small part of 5980
Crystal Cr. (Delta Cr.) 1998	487	2,800 *(1,680)*	3,195 *(1,598)*	4,100 *(2,340)*	1,300 *(660)*	+6	1) Include goat range 2) Maintain corridor along Paterson R. 3) Reduce 2nd growth
Crystal Cr. (Brown Cove) 1998	489	4,650 *(2,550)*	6,444 *(3,222)*	4,840 *(2,640)*	190 *(90)*	-372	1) Add goat range 2) Improve connectivity 3) Brown Cove in same VCU
Crystal Cr. (Pt Agassiz) 1998	489	2,350 *(1,260)*	Part of Brown Cove	2,270 *(1,400)*	-80 *(140)*	-306	1) Reduce beach and riparian buffers 2) Add high volume stands
Todahl Backline 1998	443	1,557 *(687)*	2,106 *(1,598)*	2,159 *(1,090)*	602 *(403)*	-361	1) Meet POG requirements
Niblack EA 1998	6830	583 *(344)*	1,414 *(707)*	1,499 *(828)*	916 *(484)*	+252	1) Meet POG requirements
Nemo Loop Thoms Lake 1998	479	12,203 *(7,157)*	10,000 *(5,000)*	12,430 *(7,917)*	227 *(760)*	-755	1) Fixed mapping error to allow road corridor 2) Improve connectivity
Sea Level 1999	756	1,160 *(800)*	1,308 *(654)*	1,395 *(716)*	235 *(-84)*	-315	1) Meet size requirement 2) Improve connectivity
Kuakan Timber Sale 2000	525	1,141 *(931)*	1,526 *(763)*	1,564 *(999)*	+423 *(+68)*	-126	1) Meet size requirement 2) Improve location
Doughnut Timber Sale 2000	476 477	2,001 *(1,560)*	3,090 *(1,540)*	3,090 *(1,620)*	+1,089 *(+60)*	-19	1) Meet size requirement
Polk Small Sales 2000	620	3,788 *(1,963)*	3,759 *(1,879)*	3,808 *(2,057)*	+20 *(+94)*	-153	1) Better placement
Luck Lake 2000	581 582 583	5,984 *(2,884)*	5,874 *(3,015)*	6,156 *(3,841)*	+172 *(+957)*	-537	1) Meet size requirement 2) Improve location
Salty EA 2000	747	2,576 *(1,821)*	2,546 *(1,273)*	2,603 *(1,871)*	+27 *(+50)*	-27	1) Meet size requirement 2) Improve connectivity
Woodpecker 2001[7]	448 452	10,590 *(6,580)*	9,550 *(4,780)*	10,200 *(6,550)*	-390 *(-30)*	+470	1) Meet size requirement 2) Improve location
Total	**N/A**	**60,071 *(34,802)***	**57,754 *(29,499)***	**72,122 *(39,810)***	**12,051 *(5,008)***	**-2,168**	

1) Required acreage (Appendix K, Forest Plan 1997).
2) Numbers not found in environmental document. It was determined by subsequent GIS analysis for this report.
3) All numbers are in acres; POG = volume strata H, M, L; OGR = Old-growth reserve.
4) Suitable acres are those that are suitable for timber harvest.
5) VCU 489 has two small OGRs (Pt Agassiz and Brown Cove), when combined they exceed guideline acres for VCU 489.
6) Required to be reported here as part of the resolution of an appeal on the Crystal Creek FEIS (#99-10-00-0006-A15),
7) Decision reversed on appeal.
8) Data current as of 9/30/01

Caouette, J. P., M. G. Kramer, et al. (2000). *Deconstructing the Timber Volume Paradigm in the Management of the Tongass National Forest.* Gen. Tech. Rep. PNW-GTR-482. Portland, OR, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 20.

Iverson, G. C. (1997). *Analysis of Revised TLMP Old-Growth Habitat Reserves and VPOP HCA's.* Juneau, AK, USDA Forest Service, Region 10: 4.

Kiester, A. R. and E. Eckhardt (1994). *Review of wildlife management and conservation biology on the Tongass National Forest: a synthesis with recommendations.* Corvallis, OR, Pacific Northwest Research Station, USDA Forest Service: 282.

Marcot, B. G. (1992). *Technical review of population viability conservation planning strategy*: 2 attachments: *Wildlife conservation planning on Tongass National Forest -- observations and suggestions*; and review comments of *A strategy for maintaining well-distributed, viable populations, of wildlife associated with old-growth forests in Southeast Alaska.* Corvallis, OR, Pacific Northwest Research Station: 1992.

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Suring, L. H., D. C. Crocker-Bedford, et al. (1993). *A proposed strategy for maintaining well-distributed, viable populations of wildlife associated with old-growth forests in Southeast Alaska:* Report of an Interagency Committee. Review Draft. Juneau, Alaska, USDA Forest Service Alaska Region: 279.

Biodiversity Question 2: Are the effects on biodiversity consistent with those estimated in the Forest Plan?

Monitoring Results

The biodiversity/viability analyses in the Forest Plan assumed that the maximum level of timber harvest allowed by the Plan would be harvested and that the amount and intensity of timber harvest is an index of potential effects on biodiversity (Table 2-3). This is a “coarse filter” approach, not a ”fine filter” analysis designed to address single species issues (Hunter 1990). Therefore for this analysis, if the actual amount or the intensity of harvested were less than assumed in the Forest Plan FEIS then the potential effects on biodiversity would be favorable. For this report, we assume that this approach is appropriate, and track timber harvest units for FY 1997 through FY 2001. These harvest units were placed into GIS and summarized by province and volume strata. During these years, 18,340 acres of productive old growth (POG) were treated by some type of timber harvest method (clearcut, clearcut with reserves, or partial cutting). Of these acres, 10,303 acres were in the "high" volume stratum (Julin and Caouette 1997). These data are summarized by ecological province in Table 2-4.

To date, the high volume stratum has been harvested disproportionately to its abundance. About 42 percent of the forest is in the high volume stratum, whereas about 56 percent of the harvest has been in the high volume stratum.

About 15 percent of the harvest has been a type of partial harvest resulting in uneven-aged or two-aged stands, thereby retaining higher levels of biological legacy within units (Table 2-4). The majority of harvest reported to date was planned under the 1979 TLMP. As timber sales planned under the 1997 Forest Plan are harvested, the amount of clearcut harvest is expected to decline. Partial harvest methods, depending on how they are designed, can allow for higher habitat values levels than even-aged management (Kirchhoff and Thomson 1998; Price et al. 1998; Zenner 2000; Deal 2001; Deal and Tappeiner 2001; Kramer et al. 2001).

Table 2-3. Description of Timber Harvest by Silvicultural System Under the 1997 ROD

Description	Silvicultural system	Acres
strip clearcut	even-aged	2
stand clearcut	even-aged	12,304
patch clearcut with reserves	even-aged	19
strip clearcut with reserves	even-aged	240
stand clearcut with reserves	even-aged	2,213
shelterwood removal	even-aged	392
single tree selection	uneven-aged	226
group selection	uneven-aged	784
single tree selection	uneven-aged	105
single tree selection with reserves	uneven-aged	812
stand clearcut with reserves	two-aged	603
shelterwood with reserves seed cut	two-aged	280
sanitation/salvage cut	intermediate	78
salvage cut	intermediate	283
Total		**18,341**

Biodiversity analyses within the Forest Plan assume the maximum level of harvest. The Forest Plan allows for an ASQ harvest of 267 MMBF. An ASQ of 267 MMBF equates to an annual harvest of about 8,529 acres of POG (Table 2.4) for the first decade of the plan. About half of the annual allowed harvest has occurred during the first 4.5 years of plan implementation. Therefore, the magnitude of timber harvest and the potential impacts on biodiversity have been less than those forecast in the Forest Plan. It is too early in implementation of the Forest Plan to conclude whether this trend will continue throughout the decade.

Table 2-4. Acres of Timber Harvest Since the 1997 Forest Plan Record of Decision by Province and Percentage of Total POG and High Volume POG Harvested

	Province	1997 Total POG Acres	1997-2001 POG Acres Harvested FY	1997 High Stratum POG Acres	High Stratum POG Acres Harvested FY 97-01
1	Yakutat Forelands	47,720	0	27,881	0
2	Yakutat Uplands	24,136	0	11,448	0
3	East Chichagof Is.	409,659	50	155,323	42
4	West Chichagof Is.	72,274	0	18,984	0
5	East Baranof Is.	97,888	1,020	31,768	587
6	West Baranof Is.	218,763	0	56,691	0
7	Admiralty Is.	591,407	0	337,194	0
8	Lynn Canal	155,577	0	62,363	0
9	North Coast Range	324,305	0	131,789	0
10	Kupreanof/ Mitkof Is.	318,928	2,700	104,893	1,612
11	Kuiu Is.	302,451	1,150	173,022	925
12	Central Coast Range	245,065	0	105,020	0
13	Etolin Is.	229,765	1,380	82,216	635
14	North Central POW	531,261	7,350	220,131	3,811
15	Revilla Is./ Cleveland	520,989	4,220	254,814	2,307
16	South Outer Islands	115,487	380	50,784	319
17	Dall Is. and Vicinity	68,326	0	33,925	0
18	South POW	161,981	50	74,361	44
19	North Misty Fiords	198,824	0	77,162	0
20	South Misty Fiords	312,945	0	111,452	0
21	Ice Fields	115,821	0	37,798	0
	Total	**5,063,572**	**18,300**	**2,159,019**	**10,282**

Recommendations

1) Continue to monitor the amount and intensity of timber harvest as a "coarse filter" index for the effects of management on biodiversity.
2) Support efforts to construct better existing vegetation maps for the Tongass National Forest, particularly in mapping disturbance regimes and coarse canopy forest.
3) Track type of harvest method so partial cuts can be reported separately from clearcuts.
4) In FY2002 report results by ecological subsection (Nowacki et al. 2001) and in some cases, by island.

Deal, R. L. (2001). *The effects of partial cutting on forest plant communities of western-hemlock spruce stands in Southeast Alaska.* Can. J. Forest Resources 31: 2067-2079.

Deal, R. L. and J. C. Tappeiner (2001). *The effects of partial cutting on stand structure and growth of western hemlock-Sitka spruce stands in Southeast Alaska.* Forest Ecology and Management 5486: 1-14.

Hunter, M. L. (1990). Wildlife, Forests, and Forestry. Englewood Cliffs, New Jersey, Regents/Prentice Hall.

Julin, K. R. and J. P. Caouette (1997). *Options for defining old-growth timber volume strata: a resource assessment.* In: Julin, K.R., comp. *Assessments of wildlife viability, old-growth timber volume estimates, forested wetlands, and slope stability.* C. G. Shaw, III. Portland, OR, U.S. Department of Agriculture, Forest Service. Gen. Tech. Rep. PNW-GTR-392: 24.37.

Kirchhoff, M. D. and S. R. G. Thomson (1998). *Effects of selective logging on deer habitat in Southeast Alaska: a retrospective study.* Juneau AK, ADF&G Division of Wildlife Conservation: 37.

Kramer, M. G., A. J. Hansen, et al. (2001). *Abiotic controls on windthrow and natural forest dynamics in a coastal temperate rainforest.* Ecology 82(10): 2749-2768.

Nowacki, G. J., M. Shepard, et al. (2001). *Ecological subsections of Southeast Alaska and neighboring areas of Canada.* Juneau, AK, USDA Forest Service Alaska Region.

Price, K., J. Pojar, et al. (1998). *Windthrown of clearcut-What's the difference*? Northwest Science 72 (Special Issue No. 2): 30-33.

Zenner, E. K. (2000). *Do residual trees increase structural complexity in the Pacific Northwest coniferous forests?* Ecological Applications 10(3): 800-810.

Biodiversity Question 3: Are management practices consistent with current knowledge regarding sensitive species conservation?

In the Forest Plan's monitoring plan (page 6-5), "sensitive species" are defined as federally (U. S. Fish and Wildlife Service [FWS] and National Marine Fisheries Service [NMFS]) listed threatened or endangered species, Alaska Region (Forest Service) sensitive species, and state (Alaska Department of Fish and Game [ADF&G]) species of concern. The Forest Plan separates this monitoring question into four types of information.

Monitoring Results

Part 1, Formal Reports and Presentations on TES Species. "Annually review [USFS] files and recent information regarding sensitive species taxa on the Tongass National Forest" (Forest Plan page 6-5).

Besides the Biological Evaluations (BEs) and Biological Assessments (BAs) that are discussed under part 4 below, several formal reports on TES Species were written by Forest Service biologists or by biologists funded by the Forest Service. The following are excerpts from those reports.

Steller Sea Lions. In *Seasonal Abundance of Steller Sea Lions at Dry Bay, Alaska* (September 2001, 8 pages), Bill Lucey, Yakutat Ranger District wrote:

> "Aerial surveys for Steller sea lions were completed along 164 km of the Gulf of Alaska coast from Dry Bay to Yakutat Bay... Surveys were completed from February 5 to May 10, 2001. Two sea lion haul outs were located: one at the Akwe River and one at the Alsek River. Relative abundance of sea lions followed a normal distribution rising from 208 animals on February 5, peaking at 1,033 animals on April 10 and declining to 92 animals on May 6, before the site was abandoned on May 10... Sea lion abundance appears to coincide with the presence of eulachon in the Yakutat area.
>
> Surveys for sea lions in Southeast Alaska indicate a stable population estimated at 19,000 animals (Calkins, et al, 1999)... [P]erhaps 5% of the total Southeast Alaska population of Steller sea lions may be present in the Yakutat area during the spring eulachon runs from February through May... The report of five dead sea lions from Dry Bay, in 2001, was the highest recorded over the last five years.
>
> The Dry Bay area has supported a commercial salmon fishery since the early 1900's. Currently the Forest Service has active permits for 14 special use camps in the Dry Bay area and 9 permits on the Akwe... Occupancy at fishing camps is restricted from May 1 to October 31, with the exception of two permits, which have 11-month residency clauses. In general, [human] activity does not begin occurring until late May or early June and continues through the summer months until the end of the commercial fishing period and the culmination of the fall hunting seasons. At this time, there is no indication that occupancy at existing Forest Service permitted special use camps is affecting Steller sea lions... Capra reports some interaction between outhaul fisherman, who fish the surf line, and sea lions near the mouth though there have been no observations of lethal interactions. During the course of this study, we did not observe any people boating or camping in the areas [when] sea lions were present. Sea lion presence at these haul out sites is seasonal in nature."

In *Brother's Island 2001 Monitoring and Sea Lion/Vessel Interactions* (July 2001, 12 pages + 3 appendices), Debbie Kurtz and Brian Spicer of Admiralty National Monument wrote:

> "The Brothers' Islands are located off the southeast edge of Admiralty Island between Gambier Bay and Pybus Bay... The summer sea lion haul out is located on the small island southwest of the West Brother on a beach on the northern tip... [I]t was determined that a monitoring field trip should be executed to determine public and commercial use of the islands and to observe sea lion and vessel interactions...

In the ten days that we were there, an average of 4.7 boats per day traveled within the immediate area, 2.8 per day came to the haul out to watch sea lions, and 2-3 boats per day anchored in the west side cove of West Brother. The majority of the boats maintained at least a 100-yard distance, and those that didn't, rarely caused a reaction by the sea lions. The majority of disturbance seemed to come from us when we were directly behind them on the haul out island..."

Trumpeter Swans. In "Surveys for Trumpeter Swan on the Yakutat Forelands" (October 2001, 9 pages), Nate Catterson and Bill Lucey wrote:

> "Surveys of the nesting swan population at Yakutat indicate a stable population, with only minor fluctuations in the numbers of birds seen from year to year. Of 24 nesting pairs observed on the forelands [in 2001], 12 were successful in producing young, a fifty percent nesting success rate with an average brood size of 2.5 cygnets. The 35 cygnets observed in the 2001 field surveys was the highest yet observed on the forelands" during 18 years of August surveys since 1968.
>
> The wintering swan population at Yakutat has increased over the past nine years, and may be one of the largest groups of swans wintering in south coastal Alaska. The Tawah Creek/Kardy Lakes area near Yakutat and the East Alsek River area consistently have large numbers of swans throughout the winter. The freshwater areas are rich in a variety of aquatic vegetation species, and due to the groundwater drainage, these areas remain ice-free during the winter months.
>
> Winter counts occurred between mid-January and mid-February: 89 swans in 1981, 129 in 1991, 245 in 1992, 291 in 1993, 374 in 1994, 205 in 1995, 190 in 1996, 207 in 1999, 181 in 2000, and 284 swans in 2001."

Goshawks. In *Breeding Season Diet of Northern Goshawks in Southeast Alaska with a Comparison of Techniques Used to Examine Raptor Diet* (June 2001 MS Thesis, Boise State University, 124 pages), Stephen B. Lewis** is under review by the Forest Service.

Monitoring Goshawk Occupancy and Reproduction on the Tongass National Forest by Cole Crocker-Bedford (March 1999 and March 2000) (12 pages + 1 figure) (Appendix A: Goshawk and NRIS Forms and Data Dictionaries, 3/6/01, 26 pages). This techniques paper for monitoring goshawk nest areas for occupancy and reproduction, as well as for conducting goshawk inventory, was edited on March 6, 2001. The data dictionary and data form in the base paper were reformatted into several layouts so that field biologists and data entry personnel would have more options, and could use those that best fit their needs. A computer GIS layer specifies the location of all transects, early morning listening stations, and long-watch stations of goshawk field inventories and nest area monitoring was established.

By the end of 1997, the database and GIS layer included 938 goshawk surveys (each generally one day by two biologists) from 1992 to 1997 on the Craig, Thorne Bay, Ketchikan and Misty Ranger Districts. During FY2001, the database was brought up to date for the southern Districts and all historical surveys that could be located from the northern six Districts were entered across the entire Tongass National Forest. These surveys in the goshawk database are also in the GIS layer. The database should allow more accurate analyses on occupancy of historical nest areas, because the likelihood of detecting a goshawk varies with observer quality, survey technique, level of effort, timing of surveys, and location and distribution of the surveys. The database should also permit more accurate comparison of inventory detection rates among landscapes of different compositions and different portions of the Tongass National Forest.

Wolves. Although the Alexander Archipelago wolf (*Canus lupus ligoni*) is not a listed TES Species, the US Fish and Wildlife Service (FWS) closely scrutinized its status during mid-1990, and the Forest Plan has special Standards and Guidelines (S&G's) to assure that the species remains viable in a well-

** Although not a Forest Service employee, more than 50% of the study's funding or support was contributed by the Forest Service.

distributed manner. Because this subspecies of wolf has been an issue with respect to its viability, key results will be reported from a wolf study (mostly funded by the Tongass National Forest). In *"Alexander Archipelago Wolves: Ecology and Population Viability in a Disturbed, Insular Landscape"* (August 2001 Ph.D. Dissertation, University of Alaska Fairbanks, 174 pages), David K. Person wrote:

> Abstract – "The Alexander Archipelago wolf (*Canis lupus ligoni*) occupies Southeast Alaska, a region undergoing intensive harvest of timber. Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) are the primary prey of these wolves. We conducted a telemetry study of 23 wolves on Prince of Wales and adjacent islands in Southeast Alaska between September 1992 and October 1995. We examined home range, habitat use, reproduction, mortality, and dispersal of wolves in logged landscapes and those that were relatively unlogged. We used those data to parameterize a wolf-deer model to predict long-term effects of timber harvest on the wolf-deer system on Prince of Wales and adjacent islands.
>
> Home ranges of 7 wolf packs averaged 259 km^2 in winter but only 104 km^2 during pup-rearing season (15 April–15 August). Home-range size was positively correlated to pack size, and area per individual wolf was inversely related to the proportion of winter habitat for deer within the home range. Radio collared wolves were classified as residents, extraterritorials, and dispersers. Annual mortality was 64% for extraterritorial and dispersing wolves and 31% for residents. Eighty-two percent of mortality was human caused. Radio collared wolves were located mostly at low elevations (<250 m) regardless of time of year, and selected for old-growth forest habitat during pup-rearing season. Wolves generally avoided second-growth forests and clearcuts, and their use of those habitats occurred mostly at night. Density of roads was positively correlated with rate of harvest of wolves.
>
> Simulations from our wolf-deer model indicated that deer and wolf populations on Prince of Wales and adjacent islands likely have declined since initiation of industrial-scale logging. Nonetheless, risk that the population of wolves will no longer be viable is low. Our predictions indicate that deer will decline disproportionately to decline of carrying capacity (*K*). Thus, a small change in *K* may precipitate large, long-term changes in deer numbers. The most important management strategy for the conservation of wolves in Southeast Alaska is to maintain high-quality habitat for deer. We believe that managing human access by closing roads for motorized use and limiting construction of new roads are also measures necessary to conserve wolves.
>
> Management Implications -- We documented the demise of packs from hunting and trapping that was facilitated by human access along roads. Although we agree that wolves are not averse to using roads, we are not as confident as Mech (1995) about managing human-caused mortality of wolves, particularly in Southeast Alaska. Roads facilitated legal and illegal harvest of wolves during our study and enforcing trapping and hunting regulations was difficult because of island topography and vastness of the region. Harvesting of wolves under current conditions in Southeast Alaska likely does not threaten wolves with extinction, even in areas such as Prince of Wales Island. Indeed, harvesting of wolves may serve to dampen fluctuations in wolf and deer populations, particularly following severe winters. Nonetheless, as *K* declines, deer populations will be less resilient to predation by wolves and hunting by humans. Conflict between humans and wolves over deer likely will intensify and wildlife managers will be faced with the dilemma of satisfying the demands of human subsistence users and simultaneously protecting the viability of wolf populations. Under those circumstances, human-caused mortality of wolves may be difficult to manage. We believe that managing human access by closing roads for motorized use and limiting construction of new roads are measures necessary to conserve wolves over the long term. Managing human use of existing Forest Service roads is difficult and local opposition often prevents land managers from implementing plans affecting use of roads. Limiting construction of new roads would be a more effective strategy.

> Wolves and deer in game management unit 2 are subject to "succession debt," a term analogous to "extinction debt" (Tilman et al. 1994), wherein, the inexorable pattern of forest succession initiated by past harvesting of timber will have long-term effects on the predator-prey system. Current healthy populations of wolves and deer are misleading indicators of future conditions as *K* for deer declines. Future changes in forest management likely will do little to alter the decline in habitat for deer because most of that loss will be due to logging that occurred prior to the revision of the Tongass Land Management Plan in 1997 (U. S. Forest Service 1997). In addition, our simulations indicate that the population of wolves after 2045 may be close to the minimum population of 100 wolves recommended by the U. S. Fish and Wildlife Service for a subpopulation within a larger structured or metapopulation of wolves (Fritts 1994). The population of wolves in game management unit 2 will be close to a marginal level, limiting options for population management, and making it more vulnerable to random events that effect mortality of wolves and deer.
>
> The Forest Service has contributed $360,000 to a challenge cost share agreement with the Alaska Department of Fish and Game to continue to study Ecological Relationships of wolves, deer, and habitat on Prince of Wales Island."

Moonworts. Although the two plant species under the general name "moonworts" (*Botrychium ascendens* and *B. sp.* (unknown)) are not listed TES Species, particular interest in these species exist on the Tongass National Forest due to their rarity and lack of understanding their demographics. Presently, they are proposed sensitive plant species. TES plant surveys give special note to occurrences of the *Botrychium* species. One ecological study of *Botrychium* in Yakutat, Alaska is currently underway. An excerpt from this study is given below.

Johnson-Groh, Cindy. 2001. *Permanent plot monitoring* of *moonworts (Botrychium) in Yakutat, Alaska*; Biology Department Gustavus Adolphys College, St. Peter, MN.

The author conducted ecological studies of *Botrychium* during the 2001 field season in Yakutat, Alaska. Two plots were monitored for a fourth year for the purpose of understanding the demographics of Alaskan Botrychium.

> "The data collected annually from 1998 to 2001 begins to establish the baseline knowledge of the population dynamics necessary to determine the health of the population. This in turn will allow us to assess the effects of trampling by recreational vehicles in addition to natural influences such as brown bears and successional changes. Five species of *Botrychium* were monitored in the plots including, *B. ascendens, B.lunaria, B. minganense* and two newly described species, *B. tunux* and *B.yaaxudakeit.*
>
> Whereas it is premature to draw any conclusions from the trends in these populations, it is helpful to examine the trends. Based on previous research on Midwestern *Botrychims* we know that populations vary considerably between populations and between years both in number and in size. There was an overall decrease in the population and an increase in the size in 2001 for both plots.
>
> Because moonworts are mycorrhizal it is likely that the overall heath of the populations are influenced by mycorrhizae, which easily could extend beyond the immediate plot boundaries. Care should be taken to minimize impacts such as recreational vehicles within 10 meters of the plots. It is recommended that continued monitoring be conducted to determine the population variation and resiliency. Long term monitoring is important as *Botrychium* populations are inherently variable and monitoring helps to determine what is natural population variation and what is abnormal and likely due to human caused disturbance."

Sensitive Species List. At the Wildlife, Fish, Ecology, Watershed, and Subsistence Conference of the Alaska Region of the Forest Service (April 23-27, 2001 in Sitka), the Sensitive Species list was discussed. The Forest Service Planning Regulations require Forest Plans be such that all species have their habitats managed so that species viability would be maintained in a well-distributed manner. Review has shown that the Tongass Forest Plan has strong conservation strategies and standards and

guidelines. Recommendations follow that if viability concerns develop for a species then consideration should be given to amend the Forest Plan.

LUCID Sustainability Model. *Tongass National Forest LUCID Report* (2000-2001; Volume 1, 48 pages; Volume 2, 30 pages plus Appendix 1, 76 pages). K. Krieger (lead), C. Crocker-Bedford, J. Day, R. Huecker, G. Robertsen, and M. Shephard.

During FY2000 and 2001, a Forest Service team developed a preliminary model for monitoring ecological, social and economic sustainability on the Tongass National Forest. The Tongass National Forest was one of six pilot Forests within the National Forest System for the Local Unit Criteria and Indicator Development for Sustainability (LUCID). LUCID developed potential models for implementing the International Montreal Protocol for monitoring sustainability in forested ecosystems. On the Tongass National Forest, the ecological and social areas of analyses (LUCID Units) were based on the map of Ecological Subsections of Southeast Alaska, which was completed during FY2001 by Nowacki and several others. Volume 1 of the Tongass LUCID report has 48 pages, Volume 2 has 30 pages, and Appendix 1 has 76 pages. The LUCID model uses a systems framework for a hierarchical model, to develop Principles, Criteria, Indicators, Verifiers, Data Elements, and Standards to assess sustainability. **Principles**, such as maintenance of ecosystem integrity, are explicit elements of an overall goal. **Criteria** are elements of a principle, such as portions of the overall ecosystem. **Indicators** are the several specific parameters, either quantitative or qualitative, that can be analyzed in relation to a criterion. **Verifiers** are the several sources of quantitative data and the reference values for an indicator. Ideally each verifier could be represented by one **data element** or one type of data. The condition of each data element is compared against a defined **standard** for sustainability for that data element.

The Tongass Team used the definition of ecosystem as being a type of ecosystem rather than all of Southeast Alaska. Under the Principle of Maintenance of Ecological Integrity, the Criteria were Integrity of the High-elevation Ecosystem, Integrity of the Productive Forest Ecosystem, Integrity of the Scrub Forest and Wetland Ecosystem, Integrity of the River and Stream Ecosystem, Integrity of the Lake Ecosystem, and Integrity of the Saltwater Shoreline Ecosystem. The team could have divided the types of ecosystems further, such as separating wetland scrub forest from non-forested wetland, and wetlands could have been separated among different types of wetlands, but there seemed no point in doing so for the pilot test. If the Tongass approach were to be incorporated throughout the National Forest System, other ecosystems would need to be added, such as grasslands, shrublands, cool deserts, and warm deserts. The Tongass Team followed an approach that is comprehendible and useful to both Forest Service managers and the public. For each type of ecosystem (each ecological criterion), the Tongass Team used a textbook systems model of abiotic through biotic nutrient and energy flow for its systems approach to creating indicators. Some modifications were made to the traditional nutrient-energy flow model in order to recognize important management actions, such as ecological restoration activities. By first separating overall ecosystem integrity among different types of ecosystems (criteria), and then developing indicators associated with the nutrient-energy flow model within each type of ecosystem, the model is both scientifically based and useful for Forest Service managers and the public.

No national standards existed against which to assess data on ecological sustainability. For monitoring sustainability, some North American documents have defined achievement of ecological sustainability in ambiguous terms such as “it cannot be quantitatively defined, but everyone knows it when they see it.” The Tongass LUCID team determined that much of the controversy over ecological sustainability stems from the fact that people with different philosophies, while all espousing sustainability, actually follow different definitions that are usually never explicitly defined. The philosophies can generally be related to one of the following four definitions.

(1) Ecosystem composition, structure and processes are similar to what would be present, given natural climatic changes, had it not been for settlement by Europeans, Asians and Africans during the last millennium, for introduced species from those continents, and for the industrial age and other technological changes of the last few hundred years. For any environmental parameter, its current temporal variability is similar to its variability of hundreds of years ago,

and its current mean for this century would be similar to its mean centuries ago, except as changed by natural climatic shifts.

(2) As a step down from the first definition, ecosystem composition, structure or processes are changed but not beyond amounts that could have been present given the large natural perturbations that occasionally occur in an ecosystem. For Tongass purposes, “large natural perturbations” do not include extremely rare events but do include 50-100 year events such as 50-100 year floods, 50-100 year windstorms, 50-100 year insect outbreaks, and 50-100 year epizootics. In other words, at this level of ecological integrity, cumulative anthropogenic effects may not exceed natural events that occur at 50-100 year frequencies.

(3) The production of human consumed products (wood, fiber, meat, fish, etc.) does not decline over time owing to resource depletion (harvest is compatible with non-declining even flow), and although ecosystem composition, structure, and processes do not remain within the range of natural fluctuations they can return to the state of definition #2 within 100 years.

(4) The ecosystem is modified to the extent that it cannot be returned within 100 years to condition #2 above, but use of commodity resources have remained within the level of non-declining even flow. The Tongass LUCID model uses these four definitions as standards for assessing the extent to which ecological sustainability is achieved. For most ecological data elements, definition #1 equals the +1.0 (perfectly sustainable) standard for ecological sustainability; however, so as to permit some commodity outputs some verifiers use definition #2 as the +1.0 standard. Definition #3 is used to estimate the 0.0 (neutral) standard for ecological sustainability, while definition #4 approximates the -0.5 (more bad than good) standard. The standard of -1.0 (totally unsustainable) occurs whenever none of the four definitions is met by a data element.

The overall intent of the systems framework of the Tongass LUCID model is to inexpensively “flag” potential problems before they arise, so that the potential problems can be intensively monitored and studied before they can cause significant harm. The Tongass LUCID team ran its model. However, outputs were generally incomplete owing to inadequate time and resources to compile existing data.

Part 2, Letters from Other Agencies on TES Species (other than simple concurrence on BEs/BAs). *“Consult with other agencies regarding [management practices for] these species and whether additional species should be considered for addition to the Region 10 sensitive species list” (Forest Plan page 6-5). Summarize the “results of any consultations with ADF&G and U.S. FWS under the MOU with those agencies” (Forest Plan page 6-5).*

Biologists, botanists and ecologists checked their files in all Tongass National Forest offices, both District and Supervisor’s Offices, and found only one letter from any other agency (National Marine Fisheries Service [NMFS], the FWS, Alaska Department of Fish and Game [ADF&G] or the Alaska Natural Heritage Program [ANHP]) during FY2001 with substantive concerns over species viability or S&G’s for TES Species.

Sea Lions. In a 27 October 2000 letter on the Emerald Bay Timber Sale, the NMFS required measures for the protection of humpback whales and Steller sea lions. The NMFS measures are consistent with Tongass Forest Plan S&G’s, but in the past the Forest Service has maintained it did not have the authority to implement the marine mammal S&G’s beyond Tongass National Forest lands for Non-Forest Service personnel. In many communications, the FWS and NMFS did concur, either by telephone log or letter, with Forest Service biologists with respect to the determinations of project effects in BEs/BAs (see part 4 below).

Kittlitz’s Murrelet. The FWS received a petition to list the Kittlitz’s Murrelet as Threatened. The May 9, 2001, petition by the Center for Biological Diversity, the Coastal Coalition, Lynn Canal Conservation, Inc., and the Sitka Conservation Society (49 pages), stated:

> “The Kittlitz’s murrelet, *Brachyramphus brevirostris*, is a small diving seabird in the Alcid family... The largest known populations occur in Southeast and Southcoastal Alaska.

> The Kittlitz's murrelet is a unique seabird that forages in the summer almost exclusively at the face of tidewater glaciers or near the outflow of a glacial stream. This species typically nests high in rugged coastal mountains in bare spots among the snow and ice, where females lay one egg per year... [T]he Kittlitz's murrelet is differentiated from the marbled murrelet by its highly specific glacial-affected habitat requirements."

Part 3, Analyses of Forest Plan S&G's for TES species. Evaluate data collected in studies to determine the need for changes in the standards and guidelines of the Tongass Land Management Plan (Forest Plan page 6-5).

Wildlife Biodiversity Monitoring. During FY1998 and FY1999 intra-agency and inter-agency meetings developed a process for setting priorities for studies and monitoring of wildlife assumptions within the Tongass Forest Plan (G. DeGayner, C. Crocker-Bedford and D. Aho. February 19, 1999. *A Reassessment of Management Indicator Species for the Tongass National Forest*. (20 pages.). *The Charter for Monitoring Task Groups for Wildlife MIS on Tongass National Forest* (6 pages, March 9, 2000), along with its transmittal letter by the Forest Supervisor (March 14, 2000), approved the system for objectively developing priorities for monitoring Forest Plan assumptions. During FY 2000 and early FY 2001, the Forest worked to develop priorities and monitoring protocols per the charter in a task group forum.

In FY 2001, the Tongass National Forest had programmed funds to complete the task group work on the protocols and work on field monitoring. The task group work was postponed for participation and evaluation of a conceptual framework for monitoring wildlife (Conservation Strategy) by the ADF&G funded through FWS. The Forest had pursued consensus with the other state and federal agency members of the Interagency Monitoring and Evaluation Group (USFWS and ADF&G) conducting wildlife monitoring on the Tongass.

Consensus was not achieved so the Tongass, working with other agencies, completed some wildlife monitoring as part of programmed wildlife biodiversity monitoring as detailed in the wildlife monitoring activity Table 3-1. During FY2001, debate surfaced among wildlife biologists that led to a significant reduction in wildlife monitoring, which moved much of the remaining program away from biodiversity issues. The goshawk is a Sensitive Species that serves as an example of conflicting processes.

Goshawk Task Group Report. On November 25, 2000, the Goshawk MIS Task Group completed a draft report (none of the FY2000 MIS task groups has issued a "final" report, because the task groups postponed work in light of the new ADF&G process). The Goshawk Task Group Report recommended priorities for goshawk monitoring and studies. In *The Goshawk as a Management Indicator Species for the Tongass National Forest Plan: Assumptions and Proposed Study and Monitoring* (11/25/2000, 6 pages), C. Crocker-Bedford, C. Flatten and K. Titus formally assessed information needs for goshawks in Southeast Alaska relative to assumptions in the Forest Plan. The Goshawk Task Group Report recommended using ground-based monitoring and satellite telemetry to assess goshawk natality, survival, home range size and home range overlap, to determine goshawk demography and density in various types of landscapes.

The FY2000 Tongass Monitoring Report summarized the report of the Goshawk MIS Task Group (Pages 2-160 through 2-162 in *Tongass National Forest Annual Monitoring and Evaluation Report for Fiscal Year 2000*, April 2001). One study rejected by the Goshawk Task Group Report is a landscape experiment of the persistence of goshawk nesting according to the amount and type of timber harvest. The task group advocated "gathering such information through correlation analyses, but believe[d] such landscape experiments would be costly and could not yield information for a decade." In December 2000, five alternatives were suggested at an interagency goshawk meeting: the Goshawk Task Group proposal, the Task Group objectives under two levels of reduced funding, the Task Group Proposal plus more funding to assess predator-prey ecology, and the discontinuation of all field work until goshawk data from 1991-2000 are thoroughly compiled and analyzed (see pages 2-163 to 2-164 in *Tongass National Forest Annual Monitoring and Evaluation Report for Fiscal Year 2000*, April 2001). In September 1999 the Tongass National Forest funded the compilation of ten years of data, and ADF&G's goshawk biologist C. Flatten completed a draft report by June 2001.

Part 4, Forest Service BEs/BAs for Projects and Activities. *"Summarize results of Biological Evaluations [BEs] and associated effectiveness monitoring conducted at the project-level level" (Forest Plan page 6-5).*

No project-level effectiveness monitoring was performed during FY 2001. Broad scale monitoring continued for the Steller's sea lion, the Queen Charlotte goshawk, and the Trumpeter Swan, but those monitoring activities are described above in part 1.

Biological Evaluations (BEs) were conducted for 42 projects during FY2001. The number of BEs varied widely among the Tongass Ranger Districts, which may be related to the amount of planning completed on the districts. There was 1 for Craig and Thorne Bay Precommercial Thinning, 0 for other Craig projects, 13 for other Thorne Bay projects, 5 for Ketchikan/Misty projects, 1 for Wrangell, 6 for Petersburg, 1 for Sitka Ranger District, 7 for Hoonah, 0 for Admiralty, 7 for Juneau Ranger District projects, and 0 for Yakutat. Biologists also analyzed, Tongass-wide the effects of infantry training. In most cases, the determination was either "no effect" or "not likely to adversely affect" or wording with similar meaning. The BE for the Mop Point Timber Sale on Ketchikan/Misty Ranger District arrived at the determination of "may affect individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species," the BE for the Southeast Chichagof Timber Sale on Sitka Ranger District, the BE for Blowdown Salvage Sales on Hoonah Ranger District, and the Tongass-wide BE for Infantry Training by the Alaska Army National Guard. With respect to Trumpeter Swans, the BE for Helicopter Glacier Tours on the Juneau Icefield arrived at a determination of "may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species." The BA for the Threemile Timber Sale on Petersburg Ranger District made a determination of "may affect, but not likely to adversely affect" with respect to the humpback whale, the Steller's sea lion, the Snake River chinook salmon, the Columbia River chinook salmon, the Puget Sound chinook salmon, the Willamette River chinook salmon, the Snake River sockeye salmon, the Lake Ozette sockeye salmon, the Snake River Basin steelhead, the Columbia River steelhead, and the Willamette River Steelhead.

Forest Service botanists and ecologists, and in some cases wildlife biologists wrote BEs on plants for the same 42 projects during FY2001. In almost all cases the determination was either "no effect" or "not likely to adversely affect" or wording with similar meaning as listed by ranger district below:

- Ketchikan-Misty Ranger District: The BE for the Mop Point Timber Sale arrived at the determination of "may affect individuals but not likely to adversely affect population viability" for *Glyceria leptostachya* and *Poa laxiflora* and a determination of "may affect: for *Hymenophyllum wrightii.*
- Juneau Ranger District: The BE for the JRD bunkhouse has a determination of "may affect individuals but not likely to adversely affect population viability" for *Arnica lessingii* ssp. *Norbergii, Poa Laxiflora, Carex lenticularis* var. *dolia* and H*ymnophyllum wrightii.* The BE for the Nugget Creek Placer mining has a determination of "may affect individuals but not likely to adversely affect population viability" for *Aphragmus eschscholtzianus, Arnica lessingii* spp. *Norbergii, Carex lenticularis* var. *dolia* and *Ligusticum calderi.*
- Hoonah Ranger District: The BE for Sutaheen Creek Barrier Modification Project has a determination of "may affect individuals but not likely to adversely affect population viability for *Arnica lessingii* spp. *norbergii* and *Romanzoffia unalaschcensis.* The Barrow Pit Small Sale BE has a determination of "may affect individuals but not likely to adversely affect population viability" for *Hymnophyllum wrightii.* Similarly, the BE for the Iyoukug Unit 2 Small Sale and the Seagull Small Sale each has a determination of "may affect individuals but not likely to adversely affect population viability" for *Hymnophyllum wrightii.*
- Sitka Ranger District: The BE for the Beaver Lake Trail has a determination of "may affect individuals but not likely to adversely affect population viability" for *Romanzoffia unalaschcensis.*

Evaluation of Results

Part 1, Formal Reports and Presentations on TES Species. "Annually review [USFS] files and recent information regarding sensitive species taxa on the Tongass National Forest" (Forest Plan page 6-5).

Besides the Biological Evaluations (BEs) and Biological Assessments (BAs) that are discussed under part 4 below, several formal reports on TES species were written by Forest Service biologists or by biologists funded by the Forest Service. The following are summaries of those reports.

Steller Sea Lions

Seasonal Abundance of Steller Sea Lions at Dry Bay, Alaska (September 2001, 8 pages), Bill Lucey, Yakutat Ranger District.

Aerial surveys for Steller sea lions were completed along 164 km of the Gulf of Alaska coast from Dry Bay to Yakutat Bay. Two sea lion haul outs were located. Relative abundance of sea lions followed a normal distribution rising from 208 animals on February 5, peaking at 1,033 animals (5 percent of the total Southeast Alaska population of Steller sea lions) on April 10 and declining to 92 animals on May 6, before the site was abandoned on May 10. Sea lion abundance coincides with the presence of eulachon in the Yakutat area. The report of five dead sea lions from Dry Bay, in 2001, was the highest recorded over the last five years.

At this time, there is no indication that seasonal (May 1 to October 31) occupancy at 14 existing Forest Service permitted special use camps in the Dry Bay and Akwe areas is affecting Steller sea lions. During the course of this study, no people were observed boating or camping in the areas when sea lions were present.

Brother's Island 2001 Monitoring and Sea Lion/Vessel Interactions (July 2001, 12 pages + 3 appendices), Debbie Kurtz and Brian Spicer, Admiralty National Monument.

The authors made a 10-day monitoring field trip to the Brothers Islands (located off the southeast edge of Admiralty Island) to determine public and commercial use of the islands and to observe sea lion and vessel interactions at a summer sea lion haul out located on the islands. They observed an average of 4.7 boats per day traveling within the immediate area; 2.8 per day came to the haul out to watch sea lions, and 2-3 boats per day anchored in a nearby cove. Most boats maintained at least a 100-yard distance, and did not cause a disturbance.

Trumpeter Swans

Surveys for Trumpeter Swan on the Yakutat Forelands (October 2001, 9 pages), Nate Catterson and Bill Lucey, Yakutat Ranger District.

Surveys of the nesting swan population at Yakutat indicate a stable population, with a fifty percent nesting success rate in 2001. The thirty-five cygnets observed in the 2001 field surveys was the highest yet observed on the forelands during 18 years of August surveys since 1968. The wintering swan population at Yakutat has increased over the past nine years, and may be one of the largest groups of swans wintering in south coastal Alaska.

Winter swan counts occurred between mid-January and mid-February: 89 in 1981, 129 in 1991, 245 in 1992, 291 in 1993, 374 in 1994, 205 in 1995, 190 in 1996, 207 in 1999, 181 in 2000, and 284 swans in 2001.

Goshawks

Breeding Season Diet of Northern Goshawks in Southeast Alaska with a Comparison of Techniques Used to Examine Raptor Diet (June 2001 MS Thesis, Boise State University, 124 pages), Stephen B. Lewis.**

The author used a video surveillance system to monitor northern goshawk (*Accipiter gentilis*) nests in the coastal temperate rainforest of Southeast Alaska to gather data on their diet, during the goshawk nesting seasons in 1998 and 1999. From the analysis of prey deliveries called by remote videography, the author found that goshawks delivered more birds than mammals over all of Southeast Alaska but delivered more birds in the Prince of Wales Island area than in other parts of Southeast Alaska. This work is still under review by the Forest Service.

Monitoring Goshawk Occupancy and Reproduction on the Tongass National Forest by Cole Crocker-Bedford (March 1999 and March 2000; edited March 2001; 12 pages + 1 figure and Appendix A: Goshawk and NRIS Forms and Data Dictionaries, 3/6/01, 26 pages)

This paper describes the techniques for monitoring goshawk nest areas for occupancy and reproduction, as well as for conducting goshawk inventory. In the March 2001 version, the data dictionary and data form in the base paper were reformatted into several layouts so that field biologists and data-entry personnel would have more options, and could use those that best fit their needs. A computer GIS layer specifies the location of all transects, early morning listening stations, and long-watch stations of goshawk field inventories and nest area monitoring. The spreadsheet database includes information such as date, reason for the survey, surveyors' initials, surveyors' expertise, start time, end time, time using each type of technique, as well as other key variables affecting the probability of detecting a goshawk.

By the end of 1997, the database and GIS layer included 938 goshawk surveys from 1992 to 1997 on the Craig, Thorne Bay, and Ketchikan-Misty Ranger Districts. During FY 2001 the database was brought up to date for the southern districts, plus all historical surveys that could be located from the other six districts were entered. This brought the total number of surveys entered into the database to 1,971 surveys for 1992-2001 across the entire Tongass National Forest.

Perhaps most importantly, the database should prevent further loss of data such as occurred between Iverson's reported broadcast station figures from 1992-94 and those reported on data sheets in 2001 (Iverson et al. 996, *A Conservation Assessment for the Northern Goshawk in Southeast Alaska,* PNW-GTR-387). In short, the survey database encourages more complete entry of data and eliminates loss of data.

Wolves

Alexander Archipelago Wolves: Ecology and Population Viability in a Disturbed, Insular Landscape (August 2001 Ph.D. Dissertation, University of Alaska Fairbanks, 174 pages), David K. Person.

Although the Alexander Archipelago wolf (*Canus lupus ligoni*) is not a listed TES species, the Forest Plan has special standards and guidelines to assure that the species remains viable in a well-distributed manner. Because this subspecies of wolf has been an issue with respect to its viability, we are reporting key results from this wolf study, which was mostly funded by the Tongass National Forest.

The study began with a telemetry study of 23 wolves on Prince of Wales and adjacent islands in Southeast Alaska between September 1992 and October 1995. This study examined home range, habitat use, reproduction, mortality, and dispersal of wolves in logged landscapes and those that were relatively unlogged. From the data, a wolf-deer model was developed to predict long-term effects of timber harvest on the wolf-deer system on Prince of Wales and adjacent islands.

Simulations from the model indicate that deer and wolf populations on Prince of Wales and adjacent islands likely have declined since initiation of industrial-scale logging. Eighty-two percent of wolf

** Although not a Forest Service employee, more than 50 percent of the study's funding or support was contributed by the Forest Service.

mortality was human caused; density of roads was positively correlated with the rate of harvest of wolves. The author states that the most important management strategy for the conservation of wolves in Southeast Alaska is to maintain high-quality habitat for deer, as well as managing human access by limiting construction of new roads.

The study concluded that harvesting of wolves under current conditions in Southeast Alaska likely does not threaten wolves with extinction, even in areas such as Prince of Wales Island. It did state, however, that conflict between humans and wolves over deer likely will intensify and wildlife managers will face the dilemma of satisfying the demands of human subsistence users and simultaneously protecting the viability of wolf populations.

The study also concluded that, in game management unit 2, the forest succession pattern initiated by past timber harvest will have long-term effects on the predator-prey system for wolves and deer, despite current healthy populations. Future changes in forest management likely will do little to alter the decline in habitat for deer because most of that loss is due to logging that occurred prior to the Forest Plan Revision in 1997. The study indicates that the wolf population after 2045 may be close to the minimum population of 100 wolves recommended by the U.S. Fish and Wildlife Service for a subpopulation within a larger structured or metapopulation of wolves (Fritts 1994). The Forest Service has contributed $360,000 to a challenge cost share agreement with Alaska Department of Fish and Game to continue to study Ecological Relationships of wolves, deer, and habitat on Prince of Wales Island.

<u>Moonworts</u>

Permanent plot monitoring of moonworts (Botrychium) in Yakutat, Alaska. (Johnson-Groh, Cindy. 2001. Biology Department Gustavus Adolphys College, St, Peter, MN)

Although the two plant species under the general name "moonworts" (*Botrychium ascendens* and *B. sp.* (unknown)) are not listed TES species, particular interest in these species exist on the Tongass National Forest due to their rarity and lack of understanding their demographics. Presently, they are proposed sensitive plant species.

The ecological study in Yakutat, Alaska from which this report is written is currently underway. The author collected data annually from 1998 to 2001 to establish baseline knowledge of the population dynamics necessary to determine population health. This will allow researchers to assess the effects of trampling by recreational vehicles in addition to natural influences such as brown bears and successional changes. During the 2001 field season, two plots were monitored for a fourth year for the purpose of understanding the demographics of Alaskan *Botrychium*. The study found an overall decrease in the population and an increase in the size in 2001 for both plots. It is recommended that continued monitoring be conducted to determine the population variation and resiliency. Long term monitoring is important as *Botrychium* populations are inherently variable, and monitoring helps to determine what is natural population.

<u>Sensitive Species List</u>

The Forest Service Planning Regulations require Forest Plans to manage the habitats of all species to maintain species viability in a well-distributed manner. The Tongass Forest Plan has strong conservation strategies and standards and guidelines. If a viability concern develops for a species, the Forest Plan should be amended rather than placing the species on a Sensitive Species list.

Pilot on Model to Evaluate Forest Sustainability

<u>LUCID Sustainability Model</u>

Tongass National Forest LUCID Report (2000-2001; Volume 1, 48 pages; Volume 2, 30 pages plus Appendix 1, 76 pages). K. Krieger (lead), C. Crocker-Bedford, J. Day, R. Huecker, G. Robertsen, and M. Shephard.

The Pilot to Evaluate Forest Sustainability utilizing Local Unit Criteria and Indicator Development for Sustainability (LUCID) model was completed in FY01. The objective of LUCID was to develop potential models to implement the International Montreal Protocol for monitoring sustainability in forested

ecosystems. During FY 2000 and 2001, a Forest Service team developed a preliminary model for monitoring ecological, social, and economic sustainability on the Tongass National Forest.

The LUCID model used a systems framework for a hierarchical model to develop Principles, Criteria, Indicators, Verifiers, Data Elements, and Standards to assess sustainability. The overall intent of the systems framework is to inexpensively "flag" potential problems before they arise, so that the potential problems can be intensively monitored and studied before they can cause significant harm.

For ecological analysis, the Tongass team developed integrity criteria for the following ecosystems in Southeast Alaska: high-elevation, productive forest, scrub forest and wetland, river and stream, lake, and saltwater shoreline. If the Tongass approach were to be incorporated throughout the National Forest System, other ecosystems would need to be added, such as grasslands, shrublands, cool deserts, and warm deserts. For each type of ecosystem, the team used a systems model of abiotic through biotic nutrient and energy flow for its systems approach to creating indicators. By first separating overall ecosystem integrity among different types of ecosystems (criteria), and then developing indicators associated with the nutrient-energy flow model within each type of ecosystem, the model is both scientifically based and useful for Forest Service managers and the public.

The Tongass LUCID team ran its model through applications of Netweaver and Geo-Netweaver analysis computer programs. Evaluation indicates that the outputs were generally unreliable owing to inadequate time and resources to compile existing data. The model was shown to be an effective tool for evaluation of resource data, particularly to indicate data gaps. This model and other applications of the computer programs Netweaver and Geo-Netweaver are considered as tool for ecological assessments and the possibility will be considered for application for other assessments.

Part 2, Letters from Other Agencies on TES Species (other than simple concurrence on BEs/BAs). "Consult with other agencies regarding [management practices for] these species and whether additional species should be considered for addition to the Region 10 sensitive species list" (Forest Plan page 6-5). Summarize the "results of any consultations with ADF&G and U.S. FWS under the MOU with those agencies" (Forest Plan page 6-5).

Biologists, botanists, and ecologists checked their files in all Tongass National Forest offices and found only one letter from any other agency (National Marine Fisheries Service [NMFS], the FWS, Alaska Department of Fish and Game [ADF&G] or the Alaska Natural Heritage Program [ANHP]) during FY 2001 with substantive concerns over species viability or standards and guidelines for TES Species.

Sea Lions

In an October 27, 2000 letter on the Emerald Bay Timber Sale, the NMFS required measures to protect humpback whales and Steller sea lions. NMFS measures are consistent with Tongass Forest Plan standards and guidelines, but in the past the Forest Service has maintained it did not have the authority to implement the marine mammal standards and guidelines beyond Tongass National Forest lands for non-Forest Service personnel. In many communications, the FWS and NMFS did concur with Forest Service biologists with respect to the determinations of project effects in BEs/BAs.

Kittlitz's Murrelet

On May 9, 2001, the USFWS received a petition to list the Kittlitz's Murrelet as Threatened, from the Center for Biological Diversity, the Coastal Coalition, Lynn Canal Conservation, Inc., and the Sitka Conservation Society (49 pages). The petition stated that the Kittlitz's murrelet is in need of protection under the Endangered Species Act, since it is threatened by a variety of factors including widespread reproductive failure, the elimination of suitable breeding and foraging habitat by global warming, reduction in its forage fish prey due to a climactic regime shift, oil spills, disturbance from tourism and other vessel traffic, fisheries bycatch, and other factors. According to the petitioners, the largest known populations of the bird occur in southeast and south coastal Alaska.

Part 3, Analyses of Forest Plan S&G's for TES species. *"Evaluate data collected in studies to determine the need for changes in the standards and guidelines of the Tongass Land Management plan"* (Forest Plan page 6-5).

Wildlife Biodiversity Monitoring

During FY 1998 and FY 1999, participants in intra-agency and inter-agency meetings developed a process for objectively setting priorities for studies and monitoring of wildlife assumptions within the Tongass Forest Plan. *The Charter for Monitoring Task Groups for Wildlife MIS on Tongass National Forest* (6 pages, March 9, 2000), along with its transmittal letter by the Forest Supervisor (March 14, 2000), approved the process. During FY 2000 and early FY 2001, the Forest worked to develop priorities and monitoring protocols per the charter in a task group forum.

In FY 2001, the Tongass National Forest had programmed funds to complete the task group work on the protocols and work on field monitoring. The task group work was postponed for participation and evaluation of a conceptual framework for monitoring wildlife (Conservation Strategy) by ADF&G funded through FWS. The Forest had pursued consensus with the other State and Federal agency members of the Interagency Monitoring and Evaluation Group (USFWS and ADF&G) conducting wildlife monitoring on Forest. Consensus was not achieved so the Forest completed a reduced level of wildlife biodiversity monitoring.

Part 4, Forest Service BEs/BAs for Projects and Activities. *"Summarize results of Biological Evaluations (BEs) and associated effectiveness monitoring conducted at the project-level"* (Forest Plan page 6-5).

Biological evaluations (BEs) were conducted for 42 projects and activities during FY2001. The number of BEs varied widely among the Tongass Ranger Districts, which may be related to the amount of planning completed on the districts. In most cases, the determination was either "no effect' or "not likely to adversely affect" or wording with similar meaning. Occasionally, a determination was "may affect individuals but not likely to adversely affect population viability" or "may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species." Continued review and comparison of the biological evaluations and biological assessments is important in order to monitor consistency, evaluate if a species may be effected, and track these evaluations and assessments Forest-wide.

Biodiversity Question 4: Are destructive insect and disease organisms increasing to potentially damaging levels following management activities?

Goal: Part 219 of the National Forest System Land and Resource Management Planning regulations (36 CFR section 219.12) requires the monitoring of forest health and determining if destructive insect and disease organisms have increased following vegetation management. Areas are identified where destructive insect and disease organisms have increased and management practices are modified if these increase to damaging levels. Monitor forest health and determine if destructive insects and diseases increase following vegetation management as required by the above referenced regulations.

Objective: Identify areas where destructive insect and disease organisms increase following management. Evaluate the results and modify vegetation management practices should insects and disease increase to damaging levels.

Background: A key premise of ecosystem management is that native species have adapted to, and in part, evolved with natural disturbance events. Along with wind, avalanche, and other disturbance agents, insects and diseases are important factors in the Tongass National Forest. Most occurrences of insects and disease are natural and considered a part of, and contributing factor to, ecosystem diversity. Endemic levels of insect and disease activity are usually allowed to run their course. Heart rot decays are a key agent causing small-scale disturbance in the Forest, which results in bole breakage in older trees. Average defect in late seral stands is approximately 1/3 of gross volume. The incidence of decay is significantly related to tree age. Hemlock and spruce less than about 100 years of age are generally sound. Older hemlock deteriorates at a faster rate than Sitka spruce. Based on research by James Kimmey, for trees in age class 151 to 200, defect in Sitka spruce was 5 percent, while in hemlock it was 16 percent (Farr, 1976). At 300 to 400 years of age, spruce is relatively rot free, whereas decay in hemlock averages 30 to 40 percent on a board-foot basis (Farr, 1976). Research by Kimmey (1956) also indicates that volume losses are small in young trees.

As for forest insects, trends in population are generally linked to weather conditions as opposed to forest management practices. For example, the spruce needle aphid occurred on 44,400 acres in Southeast Alaska from the southern end of Prince of Wales Island to Cape Fairweather in 1998, 29,500 acres in 2000, and 20,200 acres in 2001. The winters of 1998, 2000, and 2001 were generally mild for Southeast Alaska. In contrast, the winters of 1996 and 1997 were colder. Subsequent outbreaks of spruce needle aphid were less severe for those years, with 600 and 440 acres of land affected, respectively. Areas affected by the outbreak were late-seral spruce-hemlock forest and not managed young-growth.

Other defoliating insects, hemlock sawfly and black-headed budworm, have caused growth loss, top kill, and some mortality in late-seral forests. Outbreaks can affect western hemlock and to a lesser extent Sitka spruce throughout the Tongass, as did the outbreak in the early 1950's, which resulted in top kill and mortality on only a fraction of the acres affected. In 2000 and 2001 only 5,200 and 1,300 acres, respectively, of hemlock sawfly defoliation were recorded. Spruce beetle has been a rather minor problem on the Tongass compared to other lands in Alaska but outbreaks such as the one brought on by the extensive windthrow that occurred in the winter of 1990-1991 resulted in the buildup of a population of beetles that killed many acres of high value Sitka spruce throughout Southeast Alaska. These spruce beetle outbreaks are short in duration. The annual pest survey will help to identify where mortality has most recently occurred so that trees can be harvested before they decay. Only 109 acres were mapped on the Tongass National Forest in 2000. Only two acres of spruce beetle and 80 acres of hemlock canker mortality occurred on the Tongass in 2001.

Monitoring Question: Are destructive insect and disease organisms increasing to potentially damaging levels following management activities?

The State and Private Forestry, Forest Health Group, branch of the Forest Service flies annual aerial detection surveys over Southeast Alaska. The location of insect and disease activity is mapped and entered in a geographic information system (GIS) database. In addition to the aerial survey work, on-

the-ground site visits are also conducted. In general, current management reduces the incidence and severity of insect and disease occurrence by removing infected trees through timber harvest. Even-aged vegetation management (clearcutting, seed tree or shelterwood regeneration methods) removes defective trees with fungal infections or those with mistletoe. The Forest Plan estimated that approximately 80 percent of future harvests would use the even-aged system. Past management has been above this level. The young growth that results after an even-aged harvest is vigorous and usually decay-free.

Currently the Forest Service is exploring alternatives to clearcutting where portions of the stand, either as single trees or groups of trees, are left as legacy (residual) trees. Questions have been raised as to whether increased blowdown and increased insect and disease damage will occur due to bole wounding of residual trees and/or retention of mistletoe and other infestations within the stand. These questions will be studied in a series of three research installations across the Tongass National Forest. Results of these studies will not be available for three to five years.

Monitoring Results

The most important diseases and natural declines on the Tongass National Forest in 2001 were wood decay of live trees, hemlock dwarf mistletoe, and yellow-cedar decline. Heart and butt rot fungi cause substantial decay in late seral spruce-hemlock forests. No serious insect or disease organisms in young-growth stands were detected through monitoring efforts.

Evaluation of Results

The monitoring work conducted annually by the State and Private Forestry branch of the Forest Service, Forest Health Group and the Forest Silvicultural staff is adequate.

Fish Habitat

Goal: Maintain or restore the natural range and frequency of aquatic habitat conditions on the Tongass National Forest to maintain the abundance and diversity of resident and anadromous fish.

Objective: Determine if our best management practices (BMPs) and Forest Plan standards and guidelines have been implemented and if they are effective in protecting fish habitat and fish populations. Monitor key stream channel characteristics and representative fish populations to determine if trends attributable to forest management are evident.

Background: Fish and aquatic resources on the Tongass National Forest provide major subsistence, commercial, and sport fisheries. Abundant rainfall and watersheds with high stream densities provide a high number and diversity of freshwater fish habitats. The Tongass National Forest provides spawning and rearing habitats for the majority of fish produced in Southeast Alaska. Maintenance of this habitat and high water quality is of concern to the public, State and Federal natural resource agencies, and Native organizations.

In FY 2001, major emphasis was placed on monitoring resident fish populations, fish passage conditions at road culverts, BMP implementation, and stream habitats. Work continued to develop a synthesized approach for all aspects of fish habitat monitoring. A technical team of Forest Service specialists and an advisory team of employees from the cooperating agencies continued to meet, and a plan for synthesizing the aquatic monitoring was developed.

Fish Habitat Question 1: Are population trends for Management Indicator Species (MIS) and their relationship to habitat changes consistent with expectations?

A full monitoring program for trends in the populations of resident cutthroat trout and Dolly Varden char and their habitat was in its second year following successful completion of pilot monitoring in 1999 (Map G-2, Appendix G). This year the program focused on making population estimates and completing Tier 3 habitat surveys in all 22 monitoring streams.

The protocol incorporates a design that requires monitoring streams before and after timber harvest. Seven streams were sampled for the third year in this long-term program while others were sampled for the first time. The first stream was logged late in the season following collection of the second year of pre-harvest data.

Progress was made in developing monitoring protocols for coho and pink salmon. These species were also identified as MIS in the Forest Plan. The Forestry Sciences Laboratory, working with the Alaska Department of Fish and Game, has prepared a proposal to develop a protocol that will include annual monitoring of the number of coho from the case-study watersheds.

For pink salmon, we decided to review the approximately 30 years of spawning escapement data that have been collected in over 700 watersheds, and timber harvest history for the same watersheds. If trends are detectable in the existing data, we plan future monitoring to see if trends in pink salmon are also evident with logging conducted under the current standards and guidelines. It is assumed that older logging was less fish friendly than logging planned under the current standards and guidelines. If trends between logging and pink salmon escapement are not evident in the older data, we probably will not spend the resources to monitor for potential effects of future logging.

Kuiu Island has been selected as a pilot for review of the existing pink salmon escapement and logging history data. Eighty-one streams have been identified for Kuiu that have long-term escapement records, and a strategy has been developed to quantify the logging history for each watershed. We have linked the 81 watersheds for which we have escapement data to Forest Service GIS data, and completed and summarized past timber harvest activities in the watersheds. We have data on the percent of the watershed harvested by year, the percent harvested on slopes greater than 72 percent, the percent harvested in riparian areas, the road density, the amount of road on slopes greater than 35 percent, and the amount of road within riparian areas and on wetlands

Monitoring Results for Resident Cutthroat and Dolly Varden

At the end of the 2001 field season, 19 streams across the Tongass National Forest had been identified and field-verified that meet the selection criteria specified in the monitoring protocol (Table 2-5).

The selection criteria include:

- Streams with resident cutthroat and/or Dolly Varden;
- Reaches upstream from migration barriers to prevent interaction with anadromous fish;
- FP3, MM1 channel types;
- No previous logging, but with planned future logging; and
- Not connected to lakes.

Additionally, three streams have been identified above barriers with resident fish, but with no planned future logging. These streams will serve as controls. One of the control streams is an FP4 and another an MC1 channel type. These channel types are similar to those requested in the protocol and will be retained, at least until the number of identified control streams increases. Two of the three control streams were deliberately chosen, but the third, Gypsy Cr 2, was originally selected as a treatment stream. The selected alternative in the Madan Timber Sale FEIS did not include harvest or road construction upstream from the Gypsy Cr 2 site, so this treatment stream has been converted to a control.

Table 2-5. Summary of Stream Reaches for Resident Fish Monitoring in 2001

Ranger District	Stream Name	Year of Timber Harvest	Field Verified	Channel Type	Fish Species	Population Estimate	Habitat Survey
Craig	Drinking Water Cr	2003	Yes	MM1	Cut, DV	Yes	Yes
	N Perkins Cr	2004	Yes	MM1	Cut, DV	Yes	Yes
	Keg Cr	Control	Yes	FP4	DV	Yes	Yes
Thorne Bay	No streams identified						
Ket-Misty	Montana Cr	2003	Yes	MM1	Cut	Yes	Yes
	Packer Cr	2002	Yes	MM1	Cut, DV	Yes	Yes
	Gun Sight Cr	2002	Yes	MM1	DV	Yes	Yes
	Salty Cr	2001	Yes	MM1	Cut	Yes	Yes
	Emerald Cr	2005	Yes	MM1	Cut	Yes	Yes
Wrangell	Gypsy Cr 1	2004	Yes	MM1	Cut	Yes	Yes
	Gypsy Cr 2	Control	Yes	MC1	Cut	Yes	Yes
	West Fork Hoya Cr	2003	Yes	MM1	DV	Yes	Yes
	Vial Cr	2002	Yes	MM1	DV	Yes	Yes
	Jenkins Cr	2004	Yes	MM1	Cut	Yes	Yes
Petersburg	N Arm Farragut Cr	2004	Yes	FP3	Cut, DV	Yes	Yes
	Upper Tunehean Cr	2002	Yes	MM1	Cut, DV	Yes	Yes
	Lower Zim Cr	2003	Yes	MM1	Cut, DV	Yes	Yes
	Upper Zim Cr	2003	Yes	FP3	Cut, DV	Yes	Yes
	Upper Ohmer	Control	Yes	FP3	DV	Yes	Yes
Juneau	Dry Bay Upper	2005	Yes	FP3	DV	Yes	Yes
	Dry Bay Lower	2005	Yes	FP3	DV	Yes	Yes
Hoonah	S Fork Freshwater Cr	2005	Yes	MM1	Cut, DV	Yes	Yes
Sitka	Corner Bay Tributary	2006	Yes	FP3	Cut	Yes	Yes
Yakutat	No streams identified						

During the last three years, population estimates for resident cutthroat and Dolly Varden have been completed in 19 treatment streams; for six of those streams we now have three years of population data (Table 2-6). Population estimates have been completed in three control streams, and we have three years of data for one of those. Of the 22 streams sampled for fish populations, eight have cutthroat and Dolly Varden, seven only cutthroat, and seven only Dolly Varden.

The estimated number of cutthroat and Dolly Varden varied widely among the sampled streams (Table 2-6). We anticipated finding more fish in FP channels compared to the slightly steeper MM channels. While it is generally true that FP channels have high numbers of fish, in this case the stream with the most fish is an MM channel. This stream, Gunsight Creek, has only Dolly Varden and the estimated number in 2001 was 331. The length of sections of stream monitored is roughly identical ranging from approximately 350 to 400 feet.

Table 2-6. Fish Population Estimates for 1999 and 2000

Ranger District	Stream Name	Year of Timber Harvest	Fish Species	1999 Population Estimate	2000 Population Estimate	2000 Population Estimate
Craig	Drinking Water Cr	2003	Cut	3	12	9
	Drinking Water Cr	2003	DV	19	14	33
	N Perkins Cr	2004	Cut	18	17	18
	N Perkins Cr	2004	DV	11	20	4
	Keg Cr	Control	DV		99	131
Ket-Misty	Montana Cr	2003	Cut	31	39	42
	Packer Cr	2002	Cut		59	44
	Packer Cr	2002	DV		44	38
	Gunsight Cr	2002	DV		212	331
	Salty Cr	2001	Cut		50	81
	Emerald Cr	2005	Cut			63
	Emerald Cr	2005	DV			52
Wrangell	Gypsy Cr 1	2004	Cut	33	32	73
	Gypsy Cr 2	Control	Cut	33	61	32
	West Fork Hoya Cr	2003	DV		169	139
	Vial Cr	2002	DV		142	88
	Jenkins	2004	Cut			54
	Jenkins	2004	DV			63
Petersburg	N Arm Farragut Cr	2004	Cut	91	133	91
	N Arm Farragut Cr	2004	DV	19	50	38
	Upper Tunehean Cr	2002	Cut	97	119	54
	Upper Tunehean Cr	2002	DV	54	79	46
	Lower Zim Cr	2003	Cut		74	53
	Lower Zim Cr	2003	DV		No estimate	18
	Upper Zim Cr	2003	Cut		107	45
	Upper Zim Cr	2003	DV		56	16
	Ohmer Cr	Control	DV			51
Hoonah	S Fork Freshwater Cr	2005	Cut	No estimate		12
	S Fork Freshwater Cr	2005	DV	19		No estimate
Sitka	Corner Bay Cr	2006	Cut			72
	Corner Bay Cr	2006	DV			43
Juneau	Dry Bay Upper	2005	DV			166
	Dry Bay Lower	2005	DV			79

The amount of habitat important to fish in the monitoring streams is shown in Table 2-7. Complete data on reach lengths, total surface area, additional descriptions of the large woody debris, the pools, and substrates are available upon request. Comparison of data between streams is not as important as the eventual comparison of the habitat before and after timber harvest.

Table 2-7. Stream Habitat Survey Results for 1999, 2000, and 2001

Ranger District	Stream Name	Year of Survey	Total Pieces LWD	Total Pool Area (M2)	Average Residual Pool Depth (M)	Length Undercut Banks (M)	Substrate (D50) (MM)
Craig	Drinking Water Cr	1999	38	113.3	0.31	124	68
		2000	41	162	0.31	99	70
		2001	29	136.4	Missing	82	90
	N Perkins Cr	1999	33	96.8	0.29	87	20
		2001	45	154.2	0.30	132	32
	Keg Cr	2000	44	207.7	0.62	39	48
		2001	62	207.1	.53	118	45
Ket-Misty	Montana Cr	1999	22	154.7	0.31	19	42
		2000	32	160.6	0.31	0	39
		2001	25	91.8	0.34	0	55
	Packer Cr	2000	37	184.6	0.34	11	55
		2001	23	112.0	0.37	0	58
	Gun Sight Cr	2000	99	295.5	0.61	33	31
		2001	96	413.2	0.55	30	53
	Salty Cr	2000	20	59.7	0.30	11	45
		2001	38	159.1	0.35	1	57
	Emerald Cr	2001	missing	missing	missing	missing	missing
Wrangell	Gypsy Cr 1	1999	83	455.1	0.60	47	102
		2001	79	383.3	0.59	46	32
	Gypsy Cr 2	1999	22	135.1	0.30	8	73
		2001	30	95.6	0.30	23.5	64
	West Fork Hoya Cr	2001	64	554.7	0.61	68.0	64
	Vial Cr	2001	23	269.4	0.62	6	64
	Jenkins Cr	2001	72	339.7	0.57	73	32
Petersburg	N Arm Farragut Cr	1999	62	460.6	0.49	20	30
	Upper Tunehean Cr	2001	79	104.1	0.40	34	64
	Lower Zim Cr	2001	58	150.1	0.36	4	64
	Upper Zim Cr	2001	73	261.1	0.47	50.1	32
	Upper Ohmer Cr	2001	77	458.6	0.54	69.8	64
Hoonah	S Fork Freshwater Cr	1999	41		0.30		30
		2001	91	57.7	0.43	24	48
Sitka	Corner Bay Cr	2001	44	133.2	0.35	38.4	96
Juneau	Dry Bay Lower	2001	39	224.9	0.46	64.5	48
	Dry Bay Upper	2001	52	224.7	0.48	35.3	48

Evaluation of Results

Year 2001 was the second year for a full resident fish MIS monitoring program. A pilot run in 1999 was successful and the Interagency Monitoring and Evaluation Group (IMEG) decided to move to full implementation of the protocol. A major goal for the year was to complete population estimates and habitat surveys in all 22 monitoring streams. This goal was achieved.

A power analysis was completed that suggested 16 treatment streams would be necessary in our paired-t test experimental design. This will provide an 80 percent chance of detecting a decline in fish populations if the decline is greater than 0.80 of the standard deviation of the samples. Existing long-term data sets for resident cutthroat in Oregon and for Dolly Varden in Southeast Alaska indicate we will be able to detect a decline of approximately 20 percent of the pre-logging mean annual population.

Even though the power analysis indicated 16 streams would be sufficient for the minimum monitoring program and we now have 19 field-verified treatment streams, we plan to continue identifying and

adding treatment streams for a more robust program. Doing so, more importantly, will account for anticipated fall-down in the planned timber harvest that will likely reduce our sample of treatment streams.

Control streams were added to the design following a recommendation from the IMEG. Control streams are not required for the paired-t test, but will help to explain changes in the fish populations that might not be related to timber harvest. We plan to focus our resources on adding more treatment streams, but will also include controls where possible.

District and SO employees completed the population estimates. A crew of two or three persons made the estimates for each stream in a single day. This year we hired an employee to lead the collection of the population and habitat data. This person traveled to the ranger districts and linked up with district representatives to complete the monitoring for the northern and central Tongass. The Ketchikan and Craig Ranger Districts completed their own monitoring primarily with crews having previous monitoring experience. Both approaches helped insure consistency and will be used again next year.

The removal method population estimate was not possible for one stream, as the final catch increased substantially from the first or second catches. We believe this is a random error caused by the low number of fish of that species in that stream. Generally, the 95 percent confidence intervals around the estimated number of fish are narrow and we are satisfied with the results of the population sampling.

No trend analysis of the data is appropriate at this time. Potential trends in fish populations and habitat features due to forest management will only be possible following collection of several years of pre-harvest and post-harvest data. Timber harvest began in the watershed of one of our treatment streams in 2001 and many other streams are scheduled for harvest within the next three to five years. The protocol recommends allowing two years following timber harvest before beginning to sample the fish populations to allow for potential response from logging. As planned, the first post-harvest sampling will occur in 2004.

Fish Habitat Question 2: Are Fish Riparian standards and guidelines being implemented?

Best management practices (BMPs) described in the Soil and Water Conservation Handbook (Forest Service Handbook 2509.22, October 1996) define practices that provide protection for soil and water resources. The Fish Riparian standards and guidelines define site-specific measures to protect the resources. These standards and guidelines were monitored following a methodology described in the Tongass Monitoring Strategy. The strategy was developed to provide direction for Tongass Land Management Plan implementation monitoring.

Please refer to the 2001 BMP Monitoring Report in the Appendix for details on how the monitoring was conducted. A summary of the findings for the fish and riparian resources relative to disturbance is given below.

The BMP implementation monitoring included two distinct efforts: (1) 100 percent monitoring of the units closed out and roads complete, and (2) Interdisciplinary Team (IDT) monitoring. The 100 percent monitoring was primarily conducted by Forest Service sale administrators and engineering representatives, with assistance from resource specialists in a few circumstances. A team of Forest Service employees and other Federal and State agency representatives conducted the IDT monitoring. Included were sale administrators, engineers, foresters, planners, and resource specialists from soils, water and fisheries. The IDT monitoring was conducted on a stratified random sample of more than 10 percent of units and roads monitored during the 100 percent monitoring effort.

Monitoring Results

A total of 91 units and 16 roads were monitored this year through the 100 percent implementation monitoring process. Of these units and roads monitored, actually 83 units and 5 roads were in the FY 2001 pool. A subset of the total BMP implementation monitoring pool consisting of 23 units and 13 roads was monitored during the 10 percent IDT monitoring process. This subset included 15 units and 5 roads from the FY 2001 pool. The tables and statistics presented below reflect results from the total units and roads monitored in the 100 percent and 10 percent IDT monitoring efforts (Tables 2-8 through 2-11).

Details of this effort are included in Soil and Water Question 3 as well as the Appendix.

<u>BMPs Applicable to Fish and Riparian Management</u>

- BMP 12.6 Riparian Area Designation and Protection
- BMP 12.6a Buffer Design and Layout (TTRA and other buffers)
- BMP 13.16 Stream Channel Protection
- BMP 14.6 Timing Restrictions for Construction Activities
- BMP 14.14/ 14.17 Bridge and Culvert Design and Installation (fish passage, etc.)

As part of the best management practices implementation monitoring, information is collected on the streams monitored in the harvest units. The following tables show the number of linear feet of stream channel protected and the approximate number of stream buffer acres retained in the 2,855.5 acres monitored through the 100 percent process, and 104 acres monitored through the 10 percent IDT quality control monitoring in FY 2001 (Tables 2-8 through 2-11). Some of the units monitored were planned, laid out, and logged under pre-1997 Forest Plan Standards and Guidelines.

Table 2-8. Linear Feet and Acres of Stream Channel Protected and Lakes in FY 2001 Monitored Through Implementation Monitoring Effort

Stream Class	Linear feet of Stream Channel Protected	Approximate Acres Retained as a Streamside Buffer
Class I	9,476 feet	42.36 acres
Class II	11,514 feet	37.85 acres
Class III buffered	77,662 feet	1,034.44 acres
Class III un-buffered*	44,600 feet	
Class IV	62,210 feet	
Beach buffer		756 acres

* Unbuffered Class III streams in units planned, laid out, and harvested under pre-1997 Forest Plan Standards and Guidelines

Table 2-9. Linear Feet and Acres of Stream Channel Protected and Lakes in FY 2001 Monitored by IDT in the 10% Quality Control Sample

Stream Class	Linear feet of Stream Channel Protected	Approximate Acres Retained as a Streamside Buffer
Class I	4,176 feet	9.6 acres
Class II	5,284 feet	14.65 acres
Class III buffered	19,952 feet	20.67 acres
Class III un-buffered*	16,900 feet	
Class IV	23,700 feet	
Beach buffer		85 acres

* Unbuffered Class III streams in units planned, laid out, and harvested under pre- 1997 Forest Plan Standards and Guidelines

The tables below shows the number of times the BMPs specific to riparian areas were monitored and BMPs were implemented.

Table 2-10. BMPs Implemented in FY 2001 in 100% Implementation Monitoring Effort

BMPs Applied	Number of Times the BMP was Appropriate for Use	Number of Departures from full BMP Implementation	Number of Times Corrective Implemented
12.6/ 12.6a	64	0	0
13.16	69	0	5 (7.2%)
14.6	10	1 (10%)	0
14.14/ 14.17	14	0	1 (7.1%)
Totals	157	1 (0.6%)	6 (3.8%)

Table 2-11. BMPs Implemented in FY 2001 by IDT in 10% Quality Control Monitoring Effort

BMPs Applied	Number of Times the BMP was Appropriate for Use	Number of Departures from full BMP Implementation	Number of Times Corrective Implemented
12.6/ 12.6a	18	0	0
13.16	17	0	0
14.6	5	1 (10%)	0
14.14/ 14.17	9	0	1 (7.1%)
Totals	49	1 (2%)	1 (2%)

Summary information about the monitoring and specific results from FY 2001 is included in Soil and Water Question 3. Descriptions providing details on the events that occurred during BMP implementation in unit harvest and road construction are included in the BMP Implementation Monitoring Report in the Appendix.

After reviewing these results, the following implementation notes were made in FY 2001 and emphasis is recommended for FY 2002.

Successful implementation of BMP 12.6/ BMP 12.6a, Riparian Area Designation and Protection and Buffer Zone Design and Layout as well as BMP 13.16 Stream Channel Protection was accomplished through the diligent work of the sale administrators and fish biologists working together to ensure that the streams were correctly identified on the ground and protective measures implemented. In several cases, the streams were not correctly identified on the sale area maps nor identified properly in the environmental documents. The sale administrators worked with the fish biologists to identify the streams and add or remove buffers or other protective measures where necessary. Emphasis needs to be focused on correct identification of streams in the environmental assessment and layout phases of unit harvest. In a couple units issues associated with windfirm buffers were raised relative to observations of trees that were felled into buffers and/or streams during wind events. In one case, the sale administrator worked with the fish biologist to designate tree debris and logs removed from the stream channel. In another situation, the unit was final accepted and the operator had left the unit prior to the wind throw occurrence so the trees remained down in the buffer.

Successful implementation of BMP 14.14/14.17 Design and Installation of Bridges and Culverts was accomplished through the professional expertise of the engineers and fish biologists designing and overseeing installation of bridges and culverts that provide fish passage. This year the only work they monitored included three Class I stream culverts, two class III culverts, two Class I bridges and one Class II bridge. Most of the work completed was culvert and bridge replacement work associated with improving the structures to provide fish passage as well as hydraulic function. These culverts were generally designed following guidelines to provide fish passage with low-gradient slopes, minimum channel constriction, and outlet pools. The engineers worked with Forest and ADF&G fish biologists to gain site concurrence for design and installation. Turbidity measurements were only collected at one of these sites and the data collected was obtained outside the designated collection time. Additional focus needs to be placed on collecting turbidity measurements.

During the IDT review, concern was raised over the slope gradients of the bridge abutments at one site, and fill excavated when culverts were removed on three of the decommissioned roads monitored. The fill slopes should either be constructed at the natural angle of repose of the soil and rock fill, or the slopes stabilized utilizing geotextiles or some other gabion/ key wall mechanism to prevent soil erosion. Monitoring of the decommissioned roads focused on preventing erosion and maintaining streams. Material excavated from the culvert and/or bridge sites should be placed such that the material does not ravel back into the channel. The decommissioned road at Wrangell reviewed was an excellent example of measures taken to limit erosion potential. The rock fill material from the culvert and bridge abutments should be removed from the stream courses so the channels are returned to their natural gradient.

Evaluation of Results

Best management practices are being successfully implemented on the Tongass National Forest. The high quality work of the individuals involved with preliminary site investigations, layout, unit and road design, environmental assessment, contract preparation, and contract administration has been reflected in the successful identification of streams and implementation of protective measures in units and effective culverts.

The diligent work of the sale administrators with other specialists to correct stream identification problems has contributed significantly to successful implementation of the fish habitat best management practices. Emphasis needs to continue on correcting any improperly identified or missed streams. Specific focus should be placed on correctly identifying streams during the early stages of layout and site investigation.

The effective work of the engineers has contributed to the successful implementation of the best management practices associated with culverts and bridges. Significant emphasis needs to be focused on collecting turbidity measurements. This turbidity data is significant water quality data that can be used to evaluate our status relative to the ADEC water quality standards. This data also provides

important information as to whether corrective action needs to be taken to comply with State water quality standards. Emphasis needs to continue on site-specific designs for fill slopes associated with culverts, bridge abutments, and culvert/ bridge removal sites.

The linear feet of stream channels protected and buffers implemented (and documented in the implementation monitoring process) were lower than the amounts reported in FY 2000 for class I, II, and III streams but higher for class IV streams. In FY 2001, significantly less units were harvested, and the units that were harvested represented less volume. In FY 2001 a total of 91 units on a total of 2855.5 acres were harvested, whereas in FY 2000 a total of 210 units on a total area of 5364.3 acres were monitored. Comparing the lineal feet reported per stream class on the past two years, only 13 percent as many Class I stream feet were reported in FY 2001 as in FY 2000. Respectively, 40 percent as many Class II stream feet were reported in FY 2001 as in FY 2000, 82 percent Class III buffered streams, 116 percent Class III unbuffered streams, and 148 percent Class IV streams. These changes can be attributed to the increased emphasis on stream identification and specific location of the units relative to streams. Relative consistency was noted in the reporting procedures from FY 2000 to FY 2001.

Linear feet of stream channels protected and buffers implemented in FY 2000 were significantly higher than the amounts reported in FY 1999 and FY 1998. This reflects the difference in the location of the units, the number of units, and the monitoring process. A significant number of units were located adjacent to streams or had streams transecting the units. In 1998, streams adjacent to the unit but outside the unit boundaries were frequently considered outside the unit and the buffers were not documented during the implementation monitoring process. In FY 2000 and FY2001 these streams were monitored. The implementation of the new standards and guidelines on streams has also contributed to increase the lineal feet and acres of stream protection documented.

Fish Habitat Question 3: Are Fish and Riparian standards and guidelines effective in maintaining or improving fish habitat?

The Tongass is currently in the process of combining several of the protocols and monitoring activities associated with fish and riparian issues. A summary of the fish and riparian activities is included below and an update of the status of the project is included in Appendix D, Map G-2, Appendix G, Fish, Riparian, and Aquatic Synthesis.

Riparian and Aquatic Synthesis Summary

The riparian and aquatic synthesis was initiated to evaluate and combine fish, fish habitat, water, soil, and wetland monitoring efforts. The Forest Plan monitoring plan includes three fish habitat questions, four soil and water questions, and two wetland questions. In addition, other resources' (transportation, minerals, timber, karst, etc) monitoring questions have elements that obviously overlap these questions. The specific intent of the synthesis is to develop a strategy to minimize overlap of the various monitoring efforts and integrate findings in a watershed context.

The synthesis includes implementation monitoring, effectiveness monitoring, and fish management indicator species monitoring. In consultation with an Interagency Monitoring and Evaluation Group (IMEG) and with the support of the Forestry Sciences Lab in Juneau (FSL), over a dozen fish, soil, stream, riparian and wetland monitoring protocols have been proposed, with some fully developed and tested since 1997 (see Appendix D, Fish, Riparian, and Aquatic Synthesis). Ongoing monitoring efforts will continue at existing established sites throughout the Tongass National Forest, and in some cases will be expanded as appropriate, especially where statistical power is sought. In addition, case study watersheds will provide watershed context for these protocols and improve overall understanding of watershed response to forest management in Southeast Alaska.

The goals for the riparian aquatic synthesis in 2002 include:

- Identify set(s) of case study watersheds for forest plan monitoring.
- Maximize efficiency in logistics, data management and reporting by combining efforts into common watersheds.
- Confirm use of consistent measurement protocols (meet R10 and national standards).
- Provide an integrated aquatic monitoring "package" for the forest plan that demonstrates at-a-glance what is being monitored, where, and when to expect feedback for adaptive management.

The specific objectives for the riparian aquatic synthesis in 2002 include:

- Obtain peer review of all relevant monitoring protocols and overall study design.
- Implement all appropriate soil and water, fisheries, and riparian forest plan monitoring protocols in one set of case study watersheds to provide an integrated assessment of the effectiveness of forest plan standards and guidelines at a watershed scale.
- Control watersheds will have the following monitoring protocols implemented, in addition to stream gauging:
    - Coho Salmon MIS
    - Resident Fish MIS (if suitable site)
    - Channel Condition Assessment
    - Landslide Inventory and Assessment
    - Turbidity and Stream Temperature

- Treatment 1 and 2 watersheds will have the following monitoring protocols implemented, in addition to stream gauging:
    - Coho Salmon MIS
    - Best Management Practices Implementation (as new projects are implemented)
    - Coho Salmon MIS
    - Resident Fish MIS (if suitable sites)
    - Buffer Stability
    - Channel Condition Assessment
    - Fish Passage through Culverts
    - Landslide Inventory and Assessment
    - Turbidity and Stream Temperature

Fish Habitat Question 3 (Are Fish and Riparian standards and guidelines effective in maintaining or improving fish habitat?) is answered through the following four monitoring projects:

- Stream buffer stability;
- Stream buffer effectiveness;
- Channel condition assessment;
- Fish passage.

Stream Buffer Stability

The vegetation inherent in riparian areas is recognized as an important controlling factor and component in maintaining the natural range and frequency of aquatic habitat conditions. The Forest Plan contains several riparian standards and guidelines that are intended to retain the integrity of riparian management areas. These include: 1) maintain natural and beneficial quantities of large woody debris (LWD) over the short and long term, 2) maintain stream banks and stream channel processes, 3) provide for the beneficial uses of riparian areas by maintaining water quality, and 4) maintain optimum salmon stream temperatures. By retaining riparian vegetation in a condition found within the range of natural variability, it is anticipated that these standards and guidelines can largely be achieved.

Windthrow is a natural and important phenomenon of Southeast Alaska. It recycles forest stands, and maintains and renews the forest ecosystem. However, timber harvest has the potential to exacerbate the rate of windthrow in adjacent forest stands, including riparian buffers, beyond that found within the natural range of variability. Monitoring the incidence of windthrow in riparian management areas and comparing that to windthrow found in control riparian areas will assess whether the buffers are retained in a condition found within the natural range of variability.

Monitoring Results

A protocol to monitor the incidence of windthrow in Riparian Management Areas (RMAs) is described in the *TLMP Monitoring and Evaluation Guidebook*. This protocol monitors the incidence of windthrow in all riparian buffers of Class I, II and III streams on the Tongass National Forest that are associated with timber sales consistent with the revised Forest Plan (1997). The change in canopy cover, due to windthrow, is documented and measured using low-altitude digital still aerial photographs.

Pre-windthrow baseline conditions are obtained after harvest of the unit but prior to the windthrow prone months of the year, which are typically the winter months, beginning in October. Repeated measurements of canopy loss due to windthrow are then obtained annually for the first five years after harvest and then again 10 and 15 years after harvest.

The first year that baseline conditions were obtained from RMAs associated with harvest units harvested during that year was 2000. In 2001, 24 RMAs initially sampled in 2000 were re-sampled. In addition, another 31 RMAs associated with harvest units harvested in 2001 were sampled for the first time.

The 55 RMAs currently in the sample population are located on 3 ranger districts and 8 different timber sales. Approximately 80 percent of the RMAs are adjacent to Class III streams (non fish bearing, water quality streams). The remaining 20 percent of the RMAs are adjacent to Class I or II streams (anadromous and resident fish bearing streams). Approximately 85 percent of the harvest units associated with the RMAs have some form of partial harvest silvicultural treatment. Retention of trees within the harvest unit varies from none to approximately 75 percent (Table 2-12).

Table 2-12. Riparian Management Areas Monitored for Windthrow

Ranger District	EIS/EA	Timber Sale	Harvest Unit #	Buffer	Harvest Year	Treatment	Stream Class	Process Group	Canopy Loss
Petersburg	South Lindenburg	Dakota	138	A	2000	CC	III	HC	None
	South Lindenburg	Dakota	138	B	2000	CC	II	PA	None
	Crane/Rowan Mt.	Crane/Rowan Mt.	46	A	2000	DL	III	HC	None
	Crane/Rowan Mt.	Crane/Rowan Mt.	47	A	2000	OR	III	HC	None
	Crane/Rowan Mt.	Crane/Rowan Mt.	48	A	2000	CC	III	HC	None
	Crane/Rowan Mt.	Crane/Rowan Mt.	49	A	2000	OR	II	HC	None
	Crane/Rowan Mt.	Crane/Rowan Mt.	49	B	2000	OR	III	HC	None
	Crane/Rowan Mt.	Crane/Rowan Mt.	51	A	2000	OR	III	HC	None
	Crane/Rowan Mt.	Crane/Rowan Mt.	51	B	2000	OR	III	HC	None
	Twin Creek	Twin Creek	41	A	2001	OR	III	HC	Not Applicable
	Twin Creek	Twin Creek	41	B	2001	OR	III	AF/HC	Not Applicable
	Twin Creek	Twin Creek	41	C	2001	OR	III	AF/HC	Not Applicable
	Twin Creek	Twin Creek	41	D	2001	OR	III	HC	Not Applicable
	Twin Creek	Twin Creek	41	E	2001	OR	III	HC	Not Applicable
	Twin Creek	Twin Creek	41	F	2001	OR	III	HC	Not Applicable
	East Fork	East Fork	3a	A	2001	CR	III	HC	Not Applicable
	East Fork	East Fork	1	A	2001	CR	II	HC	Not Applicable
	East Fork	East Fork	1	B	2001	CR	III	HC	Not Applicable
	East Fork	East Fork	1	C	2001	CR	III	HC	Not Applicable
Wrangell	Nemo Loop	Nemo Loop	9a	A	2000	DL	III	HC	None
	Nemo Loop	Nemo Loop	9a	B	2000	DL	III	HC	None
	Nemo Loop	Nemo Loop	9a	C	2000	DL	III	HC	None
	Nemo Loop	Nemo Loop	9b	A	2000	DL	III	HC	None
	Nemo Loop	Nemo Loop	9b	B	2000	DL	III	HC	None
	Nemo Loop	Nemo Loop	13	A	2000	LT	III	HC	None
	Nemo Loop	Nemo Loop	13	B	2000	LT	III	HC	None
	Turn & Etolin	Turn/Small Sale	2	A	2000	DL	II/III	AF/HC	None
	Turn & Etolin	Turn/Small Sale	3	A	2000	CC	II/III	AF/HC	None
	Kuakan	Kuakan	33	A	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	33	B	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	33	C	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	33	D	2001	IS&GS	III	HC	Not

Ranger District	EIS/EA	Timber Sale	Harvest Unit #	Buffer	Harvest Year	Treatment	Stream Class	Process Group	Canopy Loss
									Applicable
	Kuakan	Kuakan	33	E	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	33	F	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	33	G	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	31	A	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	31	B	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	31	C	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	31	D	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	31	E	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	32	A	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	32	B	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	32	C	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	35	A	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	35	B	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	35	C	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	35	D	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	35	E	2001	IS&GS	III	HC	Not Applicable
	Kuakan	Kuakan	35	F	2001	IS&GS	III	HC	Not Applicable
Thorne Bay	Control Lake	Control Center	401	A	2000	CC	I	LAKE	None
	Control Lake	Control Center	401	B	2000	CC	I	PA	None
	Control Lake	Control Center	401	C	2000	CC	I	PA	None
	Control Lake	Control Center	404	A	2000	CC	I	FP	None
	Control Lake	Control Center	404	B	2000	CC	I	PA	None
	Control Lake	Control Center	417	A	2000	IS	I	FP	None

[1]Treatment: (CC = clearcut, DL=diameter limit, OR =overstory removal, IS=individual selection, G =group selection, LT=leave tree)

[2] For definitions of process groups refer to Paustian, Steve Paustian. 1992. Channel Type User Guide for the Tongass National Forest, Southeast Alaska. USDA Forest Service, R10-TP-26

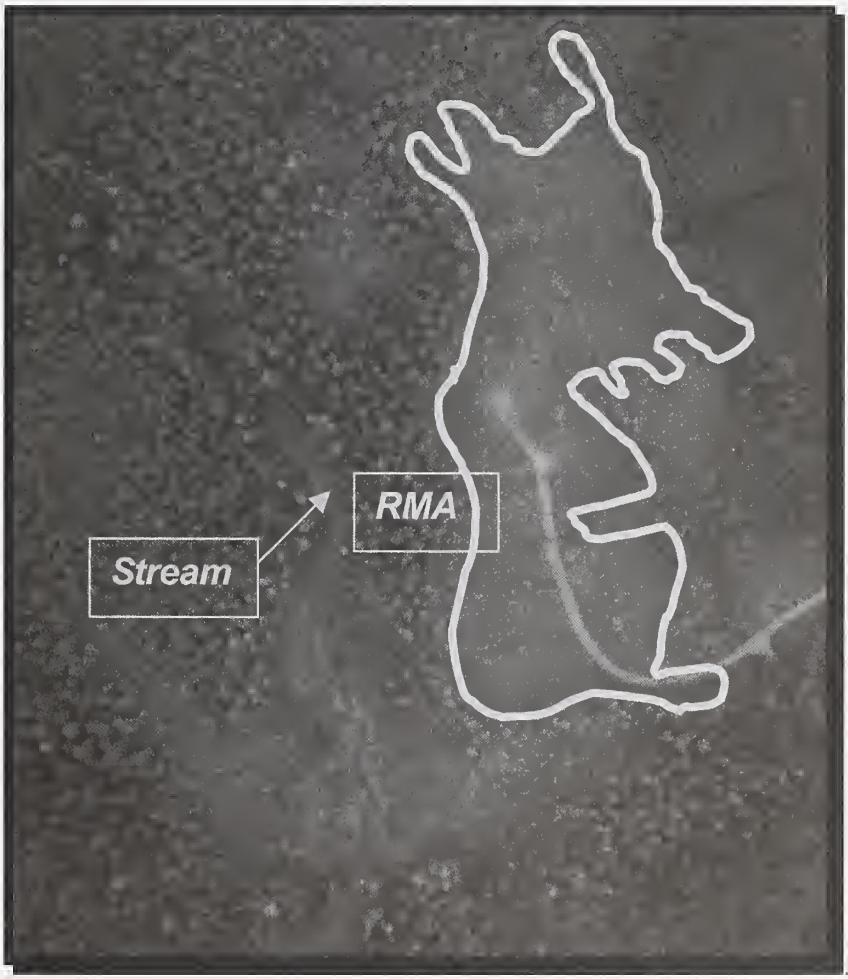
[3]Canopy Loss: Canopy loss in 2001 "Harvest Year" RMAs cannot be assessed until the 2002 resurvey of the sites. Only baseline canopy data is currently available at these sites, therefore canopy loss assessment is "Not Applicable"

Evaluation of Results

No post harvest windthrow was observed in any of the 24 RMAs associated with harvest units harvested in 2000 that were re-sampled in 2001. Although the initial results are favorable and encouraging it is premature to conclude that current harvest practices are effective in maintaining the integrity of RMAs. These results represent only the first year of a multi-year study. In addition to the need to monitor windthrow over time, it is also important to represent the complexities of the multitude of spatial variables. To represent the spatial variables this study strives to include in its sample population all RMAs associated with timber sales consistent with the 1997 Forest Plan. For the most part this has been achieved but with exceptions. To date, the sample population does not include several potential and eligible RMAs that were not included for a host of reasons. The RMAs currently excluded from monitoring include: 1) those with harvest units that had not been completely felled by late September or were felled over multiple years, 2) those where digital images were not obtained due to weather, 3) those that experienced technical difficulties in processing the digital images. Approximately 14 RMAs have not been included in the sample population for these reasons.

During 2002, we anticipate that RMAs from 2000 and 2001 will be re-sampled and additional RMAs associated with harvest units harvested in 2002 will be added to the sample population. In addition, images will be geo-referenced to provide the ability to scale the images. The ability to scale the images will be required to define the quantity of canopy loss due to windthrow, if any eventually occurs.

Low altitude digital still aerial photograph of riparian management area



Stream Buffer Effectiveness

Monitoring Results

Due primarily to personnel constraints and other priority projects, no re-surveys of post-harvest buffer effectiveness sites, or surveys of new sites were conducted in 2001. Currently there are 25 permanent reference buffer effectiveness reaches/sites along timber sale unit boundaries located throughout the Tongass. These reference reaches are Class I or II streams in six stream channel process groups. Baseline data has been collected. Five sites have been re-surveyed subsequent to (pre-Forest Plan) harvesting activities.

Completion of reports for two Hoonah Ranger District sites has been postponed to 2002 due to other priority projects. These two sites are in Class I streams with two to three years of post-harvest (pre-Forest Plan Revision ROD) survey data. This case study is focusing on changes in:

- Number and size of pools
- Number of large woody debris pieces
- Cross-section (width-to-depth ratios) and longitudinal profiles
- Substrate particle size distributions

Channel Condition Assessment

Data were collected at five sites on Prince of Wales Island and three sites on Ketchikan-Misty Ranger District in 2001. The data has been submitted to the Forestry Sciences Laboratory, which is currently analyzing the channel condition assessment data from about 70 sites in the Tongass National Forest. A publication is expected in 2002. No evaluation of results to date is available for this report

Goals and Objectives

The goal of these studies is to develop and test protocols to monitor both physical and biological response of aquatic habitat in floodplain channels to Forest Plan watershed management practices. These protocols will require a level of objectivity, consistency, and repeatability not previously found in stream or habitat surveys on the Tongass National Forest. Successful protocol development will enable Forest Service managers to document existing conditions, and the natural range of channel and habitat conditions and processes, and to determine whether streams in areas experiencing management activities have become degraded. Sampling in a number of unmanaged streams allows us to establish the central tendency and variation of habitat characteristics and populations commonly regarded as desirable standards. An important component of this work is testing the hypothesis that unmanaged and managed conditions can be discriminated well enough to clearly establish desirable standards. Design and analysis of the protocols includes links between effectiveness monitoring of physical habitat and salmonid populations.

The objectives and hypotheses for both the physical (hydrology and stream channel morphology) and the biological (salmonid populations) components from the study plan are listed below.

<u>Physical:</u>

1. On the basis of previous research (Woodsmith and Buffington, 1996) and experience, determine which variables are most likely to be successful indicators of changes in physical and biological condition of aquatic habitat.

2. Develop initial study designs that test these variables as indicators of management effects.

3. Develop effectiveness monitoring protocols based on evaluation of study results and propose adoption of these protocols as a standard subject to further modification as more data become available.

4. Assess observer and other measurement errors by repeat sampling in several reaches with a second, independent crew. An accurate assessment of these sources of variability is essential to the meaningful interpretation of monitoring results and the distinction of apparent from real change in channel condition parameters.

<u>Biological:</u>

1. Density of salmonids will increase with increasing pool frequency. This effect will be tested among stream reaches and among streams. Where Fd_i = density of fish in reach i; and Pf_i = pool frequency in reach i, then <u>H_o: b = 0 where $Fd_i = a + b*Pf_i$</u>. Pool frequency variables will be obtained from morphological measurements. Fish population data will be obtained concurrently during reach surveys.

2. Density of salmonids increases with LWD frequency. This effect will be tested among habitat units and stream reaches. Where LW_i = number of pieces of large wood * m^{-1}, then <u>H_o: b = 0 where $Fd_i = a + b*LW_i$</u>. Large wood measurements will be obtained during reach surveys concurrently with fish population estimates.

3. Larger pools will support larger fish. This hypothesis will examine the effect of individual pool size (area and depth) on the size and age class of fish in each pool within the sample reach. The ratio of the reach-averaged residual pool depth to reach-averaged bank full depth (h_r / h_{bf}) will be used as one measure of pool size for this hypothesis. A second variable, the ratio of pool area (P_a) and residual pool depth (h_r) will be used to compare the distribution of size and age class of fish.

4. Species distribution will change from headwaters to floodplain, with cutthroat trout more abundant in the headwater streams and Coho salmon (age 1+) more abundant in the flood plain channels. Channel types will be used as the discriminate variables for this hypothesis. Moderate constrained channels (MMC) will be used to represent more headwater reaches, and floodplain channels (FP) will be used to represent floodplain channels. The ratio of cutthroat density (Ct_d) to Coho salmon density (Co_d) -- Ct_d/Co_d -- will be compared between the two channel types across reaches and among streams.

5. Density of fish differs by pool type and pool complexity. Two pool types at the meso-unit level (Bryant et al., 1992) will be compared: backwater and scour. Large wood volume and residual depth in each pool will be used as a measure of pool complexity. Density of fish, stratified by species and size, will be correlated to the two complexity variables with pool type as discriminate variables.

Monitoring Results

The research results are currently being analyzed and evaluated. No results were submitted for FY 2001. A final report from the channel condition assessment research is anticipated at the end of FY 2002.

Evaluation of Results

Mark-recapture methods commonly used in small tributary streams could not be used to obtain reliable and precise fish population estimates in the larger (3^{rd} to 4^{th} order) floodplain reaches. Depletion methods offered one solution, but electro-fishing, which is commonly used to obtain estimates for this method, has not been effective in the larger Southeast Alaska streams. A method using minnow traps was developed and tested (Bryant in press). The method uses three to four trapping occasions of about 90 minutes each. The method has been adopted for various monitoring activities throughout the Tongass such as monitoring of resident cutthroat trout and Dolly Varden. Preliminary analysis of the coho salmon parr (age 1+) and reach scale habitat measurements showed a significant relationship between pools/1000m and density ($n=6$; $p=0.016$) and average residual depth and density ($n=6$; $p=0.0082$).

Results to date indicate that the habitat assessment protocol is objective, consistent, and repeatable when carried out by well-trained crews. Our methods are effective at detecting change in habitat condition as described by pool frequency, pool depth, and median surface grain size. Additional variables, such as channel width to depth ratio, relative roughness, and large woody debris loading, are included in the data set, and will be assessed to determine their sensitivity to management effects. We will also test the success of discrimination of distinct habitat conditions along a gradient of management intensity. This will address the defensibility of fixed habitat condition standards.

Land use intensity is not the only variable affecting stream channel habitat; other factors such as geology, climate, glacial history, riparian stand condition, disturbance history, and watershed size are also important. Therefore, much variability in habitat condition is evident, even among channels of similar type and land use history. Our ability to distinguish effects of natural from management-related disturbance will be enhanced in basins where knowledge of watershed processes, conditions, and disturbance history at the appropriate scale is available. Such a watershed condition framework, in combination with results from this study, will insure that interpretation of measured change or lack of change considers processes and conditions occurring throughout the watershed.

References

Bryant, M. D. 2000. Estimating fish populations by removal methods with minnow traps in Southeast Alaska streams. North American Journal of Fisheries Management. 20:923-930.

Bryant, M. D., Wright, B.E., and Davies, B.J. 1992. Application of a Hierarchical habitat unit classification system: stream habitat and salmonid distribution in Ward Creek, Southeast Alaska, 'Research Note PNW-RN-508', Portland, OR, U.S.D.A., Forest Service, Pacific Northwest Research Station, 18 pp.

Woodsmith, R.D. and Buffington, J.M. 1996. Multivariate geomorphic analysis of forest streams: implications for assessment of land use impacts on channel condition, 'Earth Surface Processes and Landforms', 21:377-393.

Fish Passage

Upstream Passage of Juvenile Fish at Road Crossings

Migration is essential for many fish species in the Tongass National Forest. Anadromous fish (fish that migrate from the ocean to freshwater to spawn) require access to spawning habitat. Juvenile anadromous fish migrate during their freshwater life stage, seeking seasonal habitats. Resident fish (fish that spend their entire life in freshwater) also may migrate seasonally in response to food, shelter and spawning needs.

Providing for fish passage at stream and road intersections to ensure fish migration is an important consideration when constructing or reconstructing forest roads. Improperly located, installed or maintained stream crossing structures can restrict these migrations, thereby adversely affecting fish populations. These structures can present a variety of potential obstacles to fish migration. The most common obstacles are excessive vertical barriers, debris blockages, and extreme water velocities that inhibit fish passage.

The Tongass Land and Resource Management Plan (Forest Plan) provides criteria to be used to assess fish passage. The Forest Plan specifies different fish passage standards for Class I streams (i.e., streams with anadromous or high quality resident fish habitat, or adfluvial fish habitat) than for Class II streams (i.e., usually small, high-gradient streams with only resident populations typically of cutthroat trout and Dolly Varden char).

For Class I streams, Forest Plan standards state that juvenile coho will have unrestricted upstream passage within a defined range of stream flows. The stream flow at the upper end of this range is the stream flow that exists two days before and two days after a peak flow. The peak flow that is used is the flow that statistically recurs about once every two years and is known as the mean annual flood. This upper limit stream flow, or "fish passage design flow," is unique for each stream since it is based upon the specific hydrologic characteristics of that stream. The fish passage design flow can be expressed as a Q_2-4 day duration stream discharge. Q_2 refers to the mean annual flood discharge and the four-day duration refers to the two-day period before and after the Q_2 (Figure 2-1). This design flow requirement is different from the Alaska Coastal Management Program standard that stipulates fish passage at a Q_2-2 day duration stream discharge. It is anticipated that this inconsistency will be corrected in cooperation with the ADF&G.

Figure 2-1. Stream discharge and flow duration with Q2

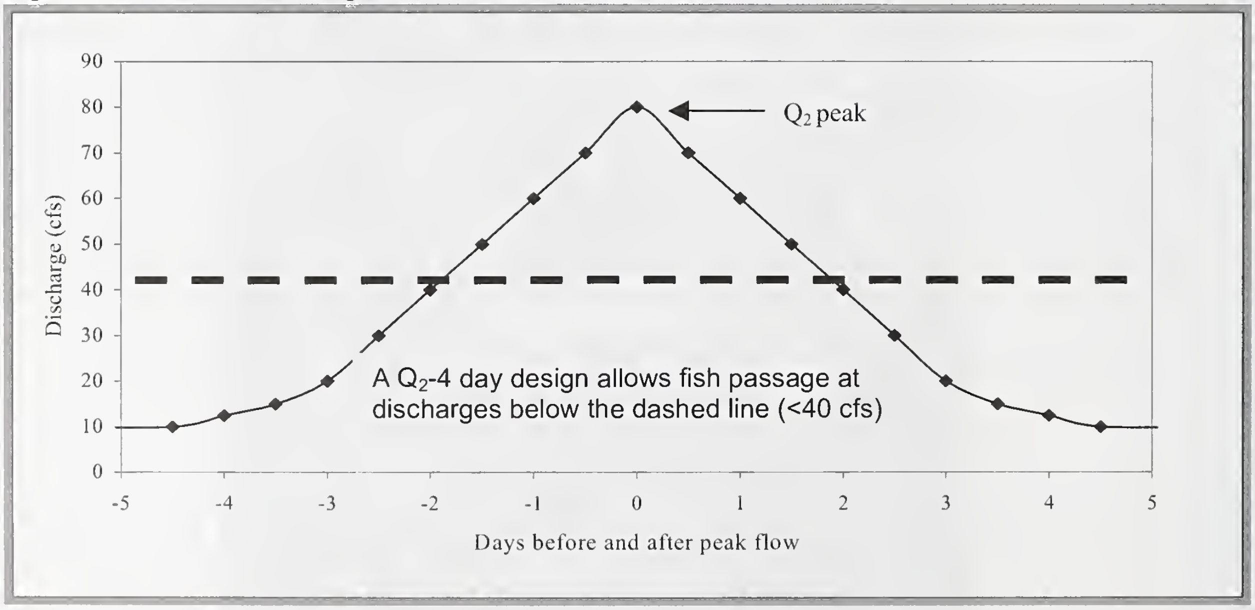


Figure 2-1 illustrates a hypothetical hydrograph that shows the relationship of time to stream discharge. The Q_2 peak is the highest discharge on the graph, and the dashed line indicates the discharge two days before and two days after the peak (i.e., the fish passage design flow). In this example, the Q_2 peak is 80 cubic feet per second (cfs) and the discharge at two days before and after this peak is 40 cfs. Therefore, the design flow is 40 cfs, which implies that a specified fish will be able to pass through the culvert at stream flows up to that amount.

For Class II streams, the Forest Plan states fish passage should generally be provided except for the occasional instance where it is not feasible to provide unrestricted passage to short sections of habitat. If fish passage is restricted, a feasibility analysis must be conducted in conjunction with ADF&G that includes the cost and feasibility of providing unrestricted fish passage while considering sensitive or unique fish populations, cumulative impacts on fish passage in the watershed, and upstream and downstream linkages between resident and anadromous life strategies of the same species. In addition, and in accordance to the Clean Water Act, a Corps of Engineers 404 permit is required where fish passage is restricted. The Forest Plan recognizes that fish passage will be restricted in some limited situations on Class II streams. This restriction would typically occur in high-gradient streams that contain short sections of habitat upstream of the road crossing. It is in these streams that the cost of providing fish passage is high and fisheries value is low. Exemptions to providing fish passage, if allowed, would consider each case on merit.

The design species for fish migration in Class II streams varies by fish species and life stage, depending on the stream process group and the species present. A design flow for fish passage is not specified.

Monitoring Results and Evaluation of Results

Determining the effect of drainage structures on fish migration is a difficult process that involves a great deal of complexity and natural variability. The knowledge and tools to assess fish passage are constantly evolving. Since actual fish passage is difficult to measure, the assessment of fish passage has been dependent on models to predict passage through stream crossing structures installed in varied stream conditions.

These models are based upon many assumptions in assessing fish passage capability. These assumptions pertain to stream hydrology, culvert hydraulics, fish swimming abilities, and migration needs. The validity and significance of the results of our monitoring are only as good as the assumptions used to build the models. These assumptions need to be tested and verified in the field in Southeast Alaska. In the coming years, more information will be forthcoming that will allow for improved confidence in the assumptions and estimates. The models need to be tested against Forest Plan fish passage criteria and compared against other fish passage criteria relative to the Coastal Zone Management Act, the Clean Water Act, and the FS-ADF&G MOU Regarding Fish Habitat and Passage.

Much progress has been made in the last several years in the development of a modeling process to evaluate the capability of fish passage at road crossings. This process is described in the *Monitoring and Evaluation Guidebook for the Tongass Land and Resource Management Plan.* Currently, insufficient data exists to adequately assess the effectiveness of Forest Plan fish passage standards and guidelines to this model.

In addition to the ongoing model development, an inventory of all fish streams along forest roads on the Tongass National Forest is nearly complete. This inventory is part of the Alaska Region Road Condition Survey (FSH 7709.58). All fish streams are systematically located and information regarding fish species, drainage structure and stream characteristics is obtained. This new inventory information, along with a model containing field-verified assumptions, will enable us to better evaluate fish passage capability against the Forest Plan standards and guidelines.

The state of knowledge about juvenile fish movement and passage through culverts is improving and much is known (e.g., Juvenile and Resident Salmonid Movement and Passage through Culverts, Washington State DOT, July 1998, Thomas Kahler and Thomas Quinn). The work done so far has identified a need for more information in several areas. More information is needed to assess the ability of juvenile coho to pass through structures at different steam flows. We need to assess fish swimming

capability in natural field conditions to verify the assumptions used in the mathematical predictions. More information is needed on the migration timing of juvenile fish, and the design flow requirements of both adult and juvenile fish. Both the Forest Plan (Q_2-4 day duration) design flow and the Alaska Coastal Management Program standard (Q_2-2 day duration) are based on very limited research and data. The Alaska Coastal Management Program standard is based on passage requirements of the Arctic Grayling, a species not native to Southeast Alaska. Whether this is an appropriate standard for anadromous and resident fish of Southeast Alaska is unknown. More knowledge is needed on the biological implications of a delay in fish migration. There is a need for more information on the migratory behavior of Dolly Varden and cutthroat trout that reside in high gradient headwater streams.

An administrative study investigating the migratory behavior of Dolly Varden and coastal cutthroat trout in headwater streams began in 2001. This study investigates the relationship of fish movement with time of the year, stream stage and size of fish. Understanding these relationships will allow for an informed decision on culvert design flow standards that will provide unimpeded passage for these species.

Fish passage standards and guidelines have evolved over time. Therefore, the assessment of the effectiveness of the standards and guidelines contained in the current Forest Plan can only be meaningfully conducted on drainage structures designed and installed as designed since the effective date of the Forest Plan (May 23, 1997). An evaluation of fish passage capability has been done on recent new roads. A total of 10.2 miles of system road has been constructed on the Tongass National Forest that is associated with EISs or EAs that were required to be consistent with the current Forest Plan. Only one road (50034, Wrangell R.D.) has Class I or Class II stream crossings identified along its route. The four drainage structures located in fish streams on this road have been removed and the natural stream course has been restored. All system roads constructed under the current Forest Plan standards and guidelines meeting the afore-mentioned criteria have been placed in storage (Maintenance Level I) and all culverts have been removed with the exception of 1.2 miles on Road 50034. There are no fish streams inventoried along the section of road that will remain open (Table 2-13).

Table 2-13. Fish Passage Capability on Newly Constructed System Roads[1/]

District	EIS or EA	System Road	Length (miles)	Class I Stream Crossings	Class II Stream Crossings	Post Project Maintenance Level	Current Maintenance Level
Petersburg	Crane/ Rowan	46360	2.4	0	0	1 (storage)	1 (storage)
Petersburg	Crane/ Rowan	46154	0.5	0	0	1 (storage)	1 (storage)
Petersburg	Crane Rowan	46152	2.0	0	0	1 (storage)	1 (storage)
Thorne Bay	Control Lake	3013005	0.3	0	0	1 (storage)	1 (storage)
Thorne Bay	Control Lake	3013070	0.5	0	0	1 (storage)	1 (storage)
Thorne Bay	Control Lake	3015400	1.3	0	0	1 (storage)	1 (storage)
Thorne Bay	Control Lake	2030127	1.0	0	0	1 (storage)	1 (storage)
Wrangell	Turn & Etolin	50034	2.2	0	4	M.P. 0.0 - 1.2 2 (open) M.P. 1.2 – 2.2 1 (storage)	M.P. 0.0 - 1.2 2 (open) M.P. 1.2 – 2.2 1 (storage)

1. Roads included are those associated with EISs or EAs that are required to be consistent with the Forest Plan.

Special Supplemental Assessment of the Upstream Passage of Juvenile Fish at Road Crossings

The previous section is intended to provide an evaluation of the effect of current drainage structure design and implementation practice upon fish passage. The intent of this supplemental section is to provide an evaluation of the current fish passage capability status of all drainage structures regardless of their date of design and installation. Standards and guidelines for the installation of drainage structures in fish streams have become more stringent through time, and fish passage needs, particularly for juvenile fish, have become better understood. Therefore, this supplemental assessment does not address the effectiveness of the current Forest Plan fish passage standards and guidelines.

This supplemental report uses the fish passage capability model (Table 2-14) and assesses mostly older drainage structures designed and installed prior to the effective date of the current Forest Plan. However, Forest Plan standards and guidelines do acknowledge the need to restore and improve the opportunities for fish passage through drainage structures regardless of when they were designed and installed. The results of this supplemental report are intended to be used to prioritize drainage structures for more intensive investigation, leading to a more reliable evaluation of the structures' fish passage capability at the design flow. Following more intensive investigation, the structures identified as not meeting current juvenile fish passage design flow standards are scheduled for corrective action. This assessment also provides a base from which future progress toward fish passage restoration can be tracked.

Methods

The standards against which fish passage capability is evaluated in this report are similar to those explained in the previous section, with the exception of the design flow. The Forest Plan states a Q_2 -4 day design flow as a standard while this assessment uses a set of assumptions based on a more stringent, conservative design flow of Q_2 -2 day as the standard. The Q_2-2 day design flow was used to be more conservative and because it is the design flow stipulated by the State of Alaska under the authority of the Alaska Coastal Management Program. The Alaska Coastal Management Program enforceable standards require that "structures shall be designed, installed and maintained to accommodate the efficient passage and movement of fish, both upstream and downstream, at all flows up to and including a mean annual seasonal flood design discharge with a two-day duration for the specific time of the year that the weakest swimming fish (design fish) present in the water body must be assured passage. The ADF&G is responsible for identifying the design fish and the seasonal period for calculation of the fish passage design flood."

The data for stream crossing drainage structures that are assessed in this report were obtained from the most recent road condition survey, including data collected during the summer of 2001. One of the objectives of the survey is to locate and characterize all the drainage structures within fish streams on the Tongass National Forest. This survey is ongoing and all fish stream crossings have not been located or characterized to date. There are approximately 3,600 miles of system road on the Tongass National Forest and approximately 1,500 miles of non-system roads. System roads are roads determined to be needed for long-term motor vehicle access. Non-system roads are roads not intended or not yet determined to be part of the forest transportation system and include temporary, unclassified and decommissioned roads.

To date, approximately 95 percent of system road and 40 percent of non-system road have been surveyed. This report assesses the fish passage capability of all fish stream road crossings currently and completely surveyed on both system and non-system roads of the Tongass National Forest. In summary, 871 surveys are complete of the 999 Class I stream crossings and 1,507 surveys are complete of the 1809 Class II stream crossings. Only streams that have had fish presence verified by sampling have been included in the analysis with the exception of some major streams with bridges that had a high probability of containing fish. Critical measurements required for fish passage assessments have not been completed on 124 (15 percent) of Class I stream crossings and 297 (20 percent) of Class II stream crossings. These stream crossings were not included in the analysis. It is expected that obtaining the measurements will continue to be a priority item in the coming field season.

The preliminary assessment of juvenile fish passage capability is based on a set of assumptions developed by an interagency group consisting of the ADF&G, Forest Service, and Alaska Department of Transportation and Public Facilities personnel. The set of assumptions is based on the best available information and is conservative. The assessment stratifies drainage structures by type, and establishes criteria thresholds for culvert gradient, stream constriction, debris blockage, and vertical barrier specific for each stratified group (Table 2-14).

Three threshold categories are established and each drainage structure is evaluated and placed in one of the three categories. The categories are defined as follows:

- **Green Category:** Conditions assumed to meet fish passage standard.
- **Red Category**: Conditions assumed not to meet fish passage standard.
- **Gray Category**: Additional analysis required determining if structures are in the Green or Red Category. A computer software application (FishXing) is used to perform the additional analysis required to determine the status of the Gray Category structures. The additional analysis was not completed for this preliminary report.

In Table 2-14, perch, or vertical barrier at the outlet of the culvert, was calculated as a flow independent measurement and was derived by subtracting the elevation of the hydraulic control located downstream of the culvert from the elevation at the bottom surface of the culvert outlet. This is a change from the 2000 assessment. In 2000, a flow dependent measurement of perch was calculated. This change was made because the flow independent assessment of culvert perch provides the maximum perch height possible, although, it may also provide unrealistic over-estimates of perch height.

The gradient of a culvert, its perch and its width to stream bed ratio were not used as criteria for determining fish passage capability if the culvert was within a palustrine channel and the culvert was backwatered. A culvert was determined to be backwatered if the bottom surface of the culvert inlet was lower than the water surface downstream of the culvert. This exception to the standard assessment protocol was implemented after site visits to palustrine channels containing culverts with the afore-mentioned conditions indicated no fish passage concerns. However, since culverts in palustrine channels are often blocked by beaver debris, any blockage was identified as a concern.

As displayed in Table 2-14, approximately 21 percent of culverts that are installed in Class I streams and 9 percent installed in Class II streams have conditions that are assumed to allow unrestricted upstream passage of juvenile fish (Green Category). Approximately 20 percent of the culverts in Class I streams and 13 percent of the culverts in Class II streams require further analysis (use of FishXing software) to determine their status (Gray Category). Approximately 59 percent of culverts in Class I streams and 78 percent of culverts in Class II streams have conditions that are assumed to restrict the upstream movement of juvenile fish at some or all stream flows (Red Category).

Table 2-14. Juvenile Fish Passage Evaluation Criteria Matrix.

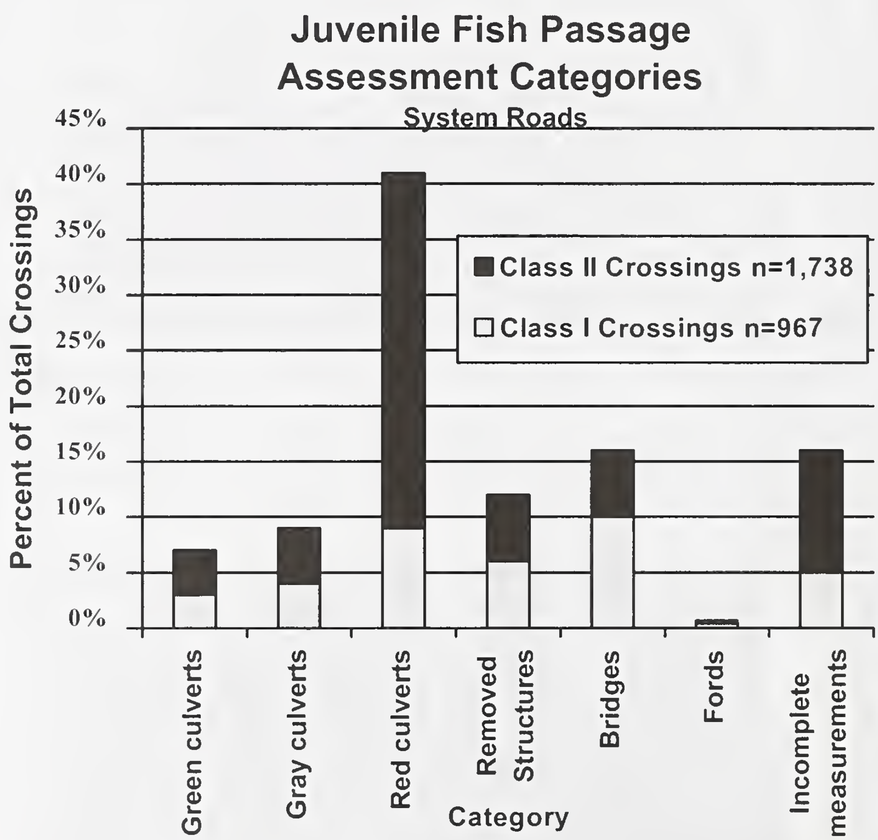
Values express the number of crossings in Both Class I and Class II streams crossing *both system and non-system roads* that are within each fish passage capability “category” as stratified by “structure Type.”

STRUCTURE TYPE	GREEN CATEGORY Conditions assumed to meet passage standards for juvenile fish			GRAY CATEGORY Additional analysis required to determine status			RED CATEGORY Conditions assumed not to meet passage standards for juvenile fish		
	CRITERIA	Class I Streams	Class II Streams	CRITERIA	Class I Streams	Class II Streams	CRITERIA	Class I Streams	Class II Streams
Bottomless pipe arch OR countersunk pipe arch AND 100% bedload coverage.	Culvert span to bed width ratio of 0.9 to 1.0 AND no blockage.	**16**	**24**	Culvert span to bed width ratio of 0.5 to 0.9 OR blockage >0% but <=10%.	**11**	**3**	Culvert span to bed width ratio <0.5 AND blockage >10%	**3**	**4**
Countersunk pipe arches >=3x1 corrugation AND Bedload < 100% coverage.	Culvert gradient <0.5% AND no perch AND no blockage AND culvert span to bed width ratio > 0.75.	**4**	**1**	Culvert gradient between 0.5% - 2.0% OR perch >0.0’ but <=4” OR blockage >0% but <=10% OR culvert span to bed width ratio between 0.5 to 0.75.	**14**	**3**	Culvert gradient >2.0% OR >4” perch OR blockage >10% OR culvert span to bed width ratio <0.5.	**35**	**39**
Circular CMP <= 48” span, AND spiral corrugations regardless of bedload coverage.	Culvert gradient <0.5% AND no perch AND no blockage AND culvert span to bed width ratio > 0.75.	**43**	**47**	Culvert gradient between 0.5% - 1.0% OR perch >0.0’ but <=4” OR blockage >0% but <=10% OR culvert span to bed width ratio between 0.5 to 0.75.	**21**	**71**	Culvert gradient >1.0% OR >4” perch OR blockage >10% OR culvert span to bed width ratio <0.5.	**161**	**708**
Circular CMP’s with annular corrugations > 3x1 and 3x1 spiral corrugations (>48” span), Bedload < 100% coverage.	Culvert gradient <0.5 % AND no perch AND no blockage AND culvert span to bed width ratio > 0.75.	**16**	**17**	Culvert gradient between 0.5% - 2.0% OR perch >0.0’ but <=4” OR blockage >0% but <=10% OR culvert span to bed width ratio between 0.5 to 0.75.	**20**	**19**	Culvert gradient >2.0% OR >4” perch OR blockage >10% OR culvert span to bed width ratio <0.5.	**36**	**110**
Circular CMP’s with >= ½ x 2 2/3 corrugations (all spans) and 3x1 spiral corrugations (>48 span), 100% bedload coverage.	Culvert gradient <1% AND no perch AND no blockage AND culvert span to bank full ratio > 0.75.	**5**	**2**	Culvert gradient between 1.0% - 3.0% OR perch >0.0’ but <=4” OR blockage >0% but <=10% OR culvert span to bed width ratio between 0.5 to 0.75.	**9**	**19**	Culvert gradient >3.0% OR >4” perch OR blockage >10% OR culvert span to bed width ratio <0.5.	**5**	**13**
Baffled OR multiple structure installations.	Baffled structures designed with current design standards	**3**	**4**	Baffled structures not necessarily designed with current design criteria OR multiple structure installations	**20**	**31**	N/A	**-**	**-**
Totals Number and Percent of culverts		87 (21%)	**95 (9%)**		**95 (20%)**	**146 (13%)**		**240 (59%)**	**874 (78%)**
Bridges & Removed Structures	All bridges or removed structures are assumed to provide unimpeded passage	449	392						

NOTES: These fish passage evaluation criteria are not culvert design criteria, because additional considerations to protect fish habitat may be required.

Figures 2-2 and 2-3 illustrate the current status of juvenile fish passage assessment for both Class I and Class II streams that cross both system and non-system roads. In addition to culvert crossings, these figures include fish streams crossed by bridges, fords, and fish streams where the crossing structure has been removed and passage restored.

Along ***system roads***, 2,705 fish stream crossings have been identified; 36 percent (967 crossings) are Class I streams and 64 percent (1,738 crossings) are Class II crossings (Figure 2-2). Approximately 41 percent of all the fish stream crossings on system roads are assumed not to meet passage standards (Red culverts). The majority (78 percent) of the Red culverts are located in Class II streams and the remaining 22 percent are within Class I streams. Approximately 7 percent of the crossings are assumed to meet passage standards (Green culverts). Approximately half of the Green culverts are located in Class I streams and approximately half are located in Class II streams. Approximately 9 percent of the crossings require more extensive analysis to determine their passage capability (Gray culverts). Approximately 40 percent of the Gray culverts are within Class I streams and 60 percent are within Class II streams. Drainage structures have been removed on approximately 12 percent of the crossings. Approximately the same number of structures have been removed within Class I streams as within Class II streams. Bridges span approximately 16 percent of the total number of fish streams located along system roads. The majority (63 percent) of the bridges span Class I streams while the remaining 37 percent span Class II streams. It is assumed that fish passage is provided at the crossings where structures have been removed or if a bridge is installed.



Approximately 16 percent of the crossings along system roads have incomplete measurements and were not assessed for fish passage capability.

Figure 2-2. Preliminary evaluation of the upstream passage of juvenile fish across System roads on the Tongass National Forest.

On non-system roads, 103 fish streams crossings have been identified, 31 percent (32 crossings) are Class I streams and 69 percent (71 crossings) are Class II crossings (Figure 2-3). Non-system roads include temporary, unclassified and decommissioned roads. These roads ideally have, or will have, drainage structures removed to alleviate resource concerns. Approximately 77 percent of the fish stream crossings identified along non-system roads had the drainage structure removed. Approximately 94 percent of the Class I stream crossings along non-system roads have had structures removed, while the remaining 6 percent had bridges spanning them. No culverts were found still installed in Class I streams along non-system roads. Approximately 68 percent of the Class II stream crossings along non-system roads have had structures removed. Approximately 7 percent of the Class II crossings have bridges spanning them. Approximately 8 percent of the Class II stream crossings still had culverts installed. Of the Class II crossings in which culverts are still installed, approximately 40 percent (2 stream crossings) are classified as Red culverts, approximately 40 percent are classified as Gray culverts and 20 percent are classified as Green culverts. Approximately 11 percent of the crossings along non-system roads have incomplete measurements and were not assessed for fish passage capability. All of the incomplete measurements are at Class II stream crossings.

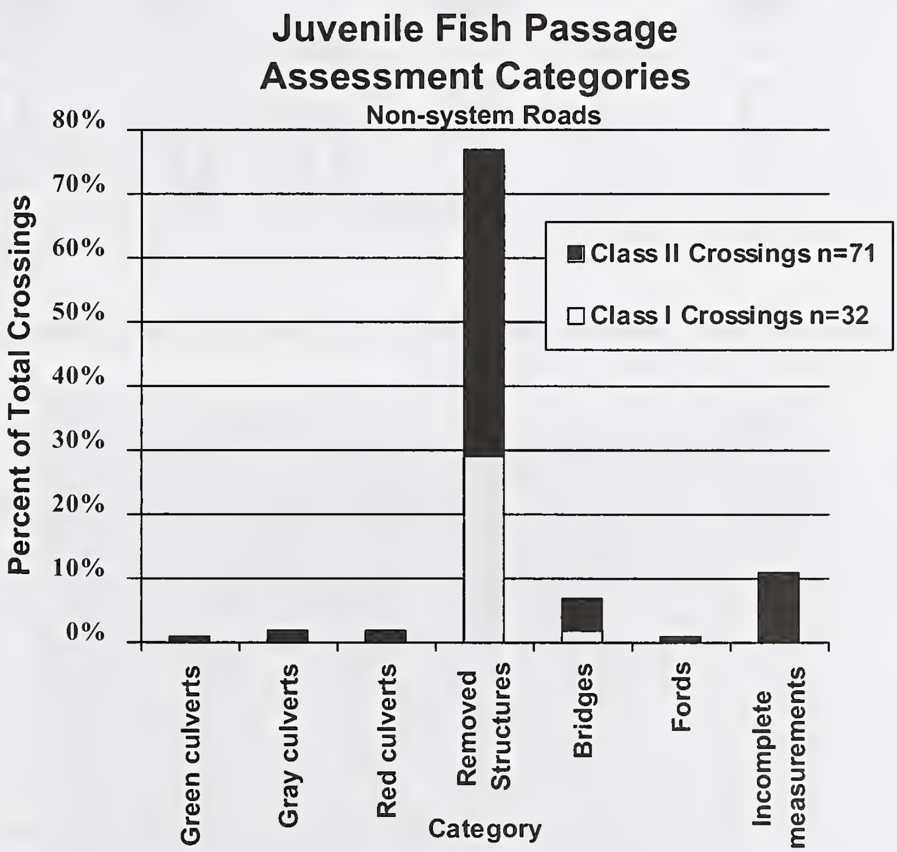


Figure 2-3. Preliminary evaluation of the upstream passage of juvenile fish across Non-system roads on the Tongass National Forest.

Culverts that are in the Red category are assumed not to be providing juvenile fish passage at the design flow for one of four reasons: 1) excessive stream constriction (leading to potentially excessive culvert water velocities in the culvert); 2) excessive culvert gradient (also leading to potentially excessive culvert water velocities in the culvert); 3) excessive culvert perch (creating a

vertical barrier) or 4) debris blockage within the culvert (Figure 2-4). Excessive culvert gradient is the most prevalent single reason that culverts in Class I and Class II streams are assumed not to provide passage at the design flow and explains the Red category designation for 21 percent of the culverts. Stream constriction accounts for 4 percent, perched culverts account for 13 percent, and debris blockages account for approximately 2 percent of the Red culverts. A combination of culvert gradient and perch is responsible for 37 percent and other combinations of the four reasons explain the Red category designation for the remaining 22 percent of Red culverts.

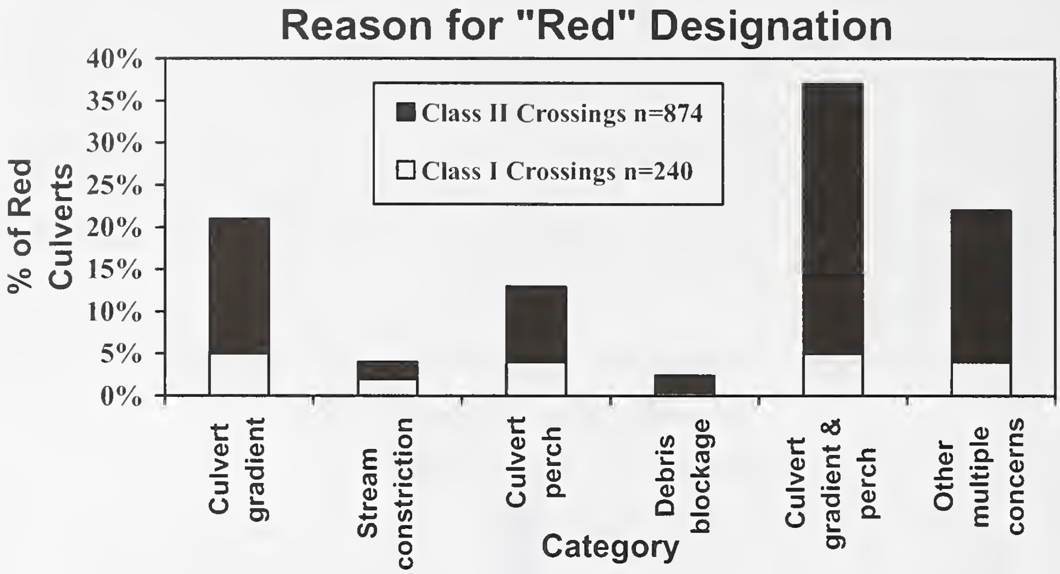


Figure 2-4. Reasons that culverts are assumed not to provide upstream juvenile fish passage at the design flow standard.

Discussion

It is important to note that fish are assumed to be able to pass through most of the culverts identified in the Red and Gray categories most of the year. Most of these culverts do have fish located upstream of them. We are mostly concerned that passage may not be possible for juvenile fish during periods of high stream flow. The results presented are for juvenile fish passage, and it is likely that stronger swimming adult fish are not restricted in most of the structures. The drainage structures assessed in this report for their consistency with current juvenile fish passage standards include drainage structures installed at various times with various fish passage design standards under the Forest Plan. Therefore, the results should not be necessarily interpreted to conclude that the reason for a specific structure not meeting the current standards is due to negligent structure design. This supplemental report is not an evaluation of the current management of the Tongass National Forest. It does not assess the effectiveness of Forest Plan standards and guidelines. It does provide a baseline of current but preliminary fish passage conditions that can be used to track the commitment and progress toward maintaining, restoring or improving the opportunities for fish movement on the Tongass National Forest.

During 2001, progress continued to be made toward understanding and improving fish passage along Tongass National Forest roads. The initial inventory and survey of all fish streams and their fish passage conditions along Forest roads is nearing completion. Last year more forest roads were surveyed and many additional fish streams were identified and assessed. Many of the fish stream crossings that had been previously identified but had an incomplete set of measurements were revisited during this last year and the measurements necessary for fish passage

assessment were obtained. Approximately 40 percent more fish stream crossings are included in this analysis compared to a similar analysis done in 2000, and approximately 66 percent more than an analysis completed in 1999. We continued survey work to quantify and qualify the fish habitat located upstream of culverts assumed not to be meeting fish passage standards. These surveys will assist in developing a prioritization schedule for corrective action. To date, approximately 870 of the habitat surveys have been completed, which represents about 64 percent of the planned number of surveys. Improved standards for drainage structure design in fish streams are being developed. A Forest Service study on the Tongass National Forest was begun in 2001 that will help in understanding the migration needs of headwater populations of Dolly Varden char and coastal cutthroat trout. There is currently substantial funding available to correct fish passage problems identified through the survey and analysis process. During 2001, 12 drainage structures within fish streams on the Tongass National Forest were replaced with structures designed to provide fish passage. A contract was awarded to design 90 drainage structures that will meet fish passage standards and will replace those that currently do not. These new structures will be installed in 2002. Our ability to repair/ improve / replace culverts is based upon funding/ location and contractual ability to accomplish work.

In the following years, work will continue toward understanding and improving fish passage on the Tongass National Forest. In FY 2002, nearly 3 million dollars is budgeted toward projects that will further the understanding of or improve fish passage on the Tongass National Forest. It is a realistic expectation that in the near future most of the fish passage concerns on Class I streams and the lower gradient Class II streams will be resolved by providing corrective actions. Providing unrestricted fish passage on the higher gradient Class II crossings is generally more difficult to achieve and often have a less desirable cost to benefit ratio. Many of the structures in the higher gradient Class II streams have small quantities of poor habitat located upstream of them. The fish passage concerns on these streams will be eventually resolved by providing corrective actions or through interagency analysis and mitigation. This is a very dynamic program relative to protocols that are constantly changing based on new field information gathered as a result of ongoing work.

Heritage Resources

Goal: Identify, evaluate, preserve, protect, and enhance heritage resources.

Objective: Protect heritage resources (as described in the Heritage Resources Forest-wide standards and guidelines).

Background: The Forest Plan provides guidance on maintenance of a heritage resource management program that identifies, evaluates, protects, and enhances significant heritage resources. This guidance applies Forest-wide and on a project-specific basis pursuant to the National Historic Preservation Act, as amended, as well as other relevant acts and implementing regulations (including the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act and the American Indian Religious Freedom Act). The Forest Plan heritage resources standards and guidelines address:

- Project clearance/inventory;
- Project implementation;
- Mitigation;
- Enhancement.

The National Historic Preservation Act (NHPA) establishes a general framework for how federal agencies manage heritage resources. Section 106 of the NHPA requires federal agencies like the Forest Service to consider what effect an "undertaking" (project, activity or program funded in whole or in part under our direct or indirect jurisdiction) may have on heritage resources eligible for, or listed on, the National Register of Historic Places (National Register). When it is deemed necessary to complete a heritage resource inventory for an undertaking, archeologists usually check the condition of previously identified heritage resources within the project area. Section 110 of the NHPA directs federal agencies to assume responsibility for the preservation of heritage resources that are eligible for the National Register and owned or controlled by the agency. Each federal agency must establish a preservation program for the identification, evaluation, protection and nomination to the National Register of significant heritage resources. To the maximum extent feasible, each federal agency must use National Register eligible properties available to it in carrying out its duties.

Since July 1995, we have performed some of our heritage resource responsibilities under terms of a Programmatic Agreement (PA) with the Advisory Council on Historic Preservation and the Alaska State Historic Preservation Officer. The PA formalizes our compliance with Section 106 of the NHPA and includes site and project monitoring standards. PA standards call for monitoring of project areas either during or after project implementation to judge the effectiveness of current models that predict the heritage resource sensitivity of any given area of the forest. The PA expired September 30, 2000 and we are currently negotiating terms of a new PA that incorporates 1992 amendments to the NHPA (codified by new rules published at 36 CFR 800). One of the most notable regulatory changes is an enhanced role of Indian Tribes in the Section 106 consultation process.

Heritage Resources Question 1: Are Heritage Resources standards and guidelines being implemented?

The Forest Plan standards and guidelines are being implemented.

Monitoring Results

We evaluated 60 undertakings in FY 2001 for their potential to affect heritage resources eligible to the National Register (Map G-1, Appendix G). Qualified professionals using accepted professional standards administer the heritage resource workload. Contractors and project administrators are aware of heritage resource legal requirements. Monitoring suggests some sites are being damaged not directly as a result of project implementation, but as remote areas become more accessible.

The FY 2001 results of the implementation of the Heritage Forest Plan Standards and Guidelines for the Tongass National Forest are displayed in Table 2-15.

Table 2-15. Results of Implementation of the Heritage Forest Plan Standards and Guidelines

Projects Reviewed For Their Potential To Affect Heritage Resources	Projects Reviewed Under Standard 36 CFR 800 Procedures	Projects Requiring Mitigation Other Than Avoidance	New Sites Located During Project Implementation	Site Enhancements
60	6	1	1	0

Project Inventory/Clearance

The standard consultation procedures outlined in 36 CFR 800 were followed for six undertakings (10 percent of all reviewed projects) prior to the signing of a NEPA decision memo. For the remaining 54 projects we followed modified consultation procedures outlined in the PA with the Alaska State Preservation Officer (SHPO) and the Advisory Council on Historic Preservation.

Project Implementation

Qualified heritage resource specialists supervised all project evaluations and inventories. Forest Service archaeologists supervised most of these projects, while qualified contractors completed the remaining projects. Included in all heritage resource reports is a statement indicating that if a heritage resource site is identified during project implementation the work will stop in that area and an archaeologist and the District Ranger will be notified. No work shall proceed at this locality until the archaeologist has completed necessary documentation and consulted with the Alaska SHPO, and possibly other consulting parties (Advisory Council on Historic Preservation, Indian Tribes, local governments, etc.). A Forest Service crew dispatched to a small fire on Admiralty National Monument discovered an ancient human skull and stone tool. They notified a Forest Service archaeologist and the monument ranger who in turn notified potentially affiliated Indian tribes under terms of the Native American Graves Protection and Repatriation Act (NAGPRA).

Mitigation

Avoidance of adverse effects is the preferred mitigation option for heritage resources on the Tongass National Forest. During FY 2001 one project, the Tuxekan Timber Sale, required mitigation other than avoidance. Indirect effects are possible at several National Register eligible sites and we plan to mitigate those potential effects through a program of public education and post-project monitoring. In another NAGPRA case, archaeological contractors inventorying portions of the proposed Kosciusko Timber Sale discovered ancient human remains at two locations. The Craig Ranger District is consulting with the affiliated Indian tribes.

Enhancement

Public outreach and other enhancement activities are perhaps our best tool in protecting heritage resources for future generations. We monitor enhancement activities to determine whether significant sites are managed to take advantage of their recreational and educational potential, while protecting the values that make them significant. Enhancement includes products like the *Passages* brochure and *The Bear Stands Up* video and programs such as those presented at the Southeast Alaska Discovery Center (Ketchikan) and on the Alaska Marine Highway. This year we updated a popular rock art brochure to include a stronger site stewardship message.

The Tongass National Forest has a strong public outreach program that advocates forest visitors take an active stewardship role. Passport In Time (PIT), a popular national program, offers the public opportunities to work with archaeologists on a variety of projects. Volunteers participated in several Tongass PIT projects during 2001, including several heritage resource site-monitoring projects. These PIT monitoring projects allowed us to maximize limited funding and monitor more sites than we would have otherwise.

The Ketchikan-Misty Ranger District sponsored two PIT projects to monitor the condition of heritage resource sites and conduct coastal site inventories. A total of 15 volunteers donated 1,112 hours of labor to monitor the condition of 24 sites and document 11 new sites. The volunteers learned a great deal about Tlingit culture, traditional subsistence lifestyles and the area's historic sites. They learned much about Forest Service heritage resource management, Southeast Alaska and about each other.

The Thorne Bay Ranger District sponsored a PIT monitoring project on the northern part of Prince of Wales Island. Archaeologists and PIT volunteers monitored 19 sites, noting natural or human-caused impacts at six sites. As with most PIT projects, many benefits resulted, both tangible and intangible. The subtlest accomplishments are in the area of education. PIT volunteers traveled to the sites in trucks and kayaks with Forest Service archaeologists, a recreation planner and a cave manager. The group had an opportunity to discuss a wide variety of subjects, ranging from peopling of the Americas to the potential effects of timber harvest on fish trap preservation; from the productivity of salmon streams draining karst watersheds to the relationships between Alaska Native corporations and rural communities in the management of Alaska Native rock art sites; from how to pack a modern sea kayak to how ancient people used ocean tides and currents to facilitate their navigation. The long-term benefit of these discussions is a better-educated, more objective public, which appreciates the resource issues confronting managers of National Forest System lands.

The interdisciplinary research at 49 PET 408 (On Your Knees Cave), a 9,200-year-old campsite on northern Prince of Wales Island, was not active in the field in 2001 for the first time since fieldwork began in 1994. Both paleontologist Tim Heaton (University of South Dakota) and archaeologist Jim Dixon (University of Colorado-Boulder) spent the summer in the lab analyzing the copious materials collected from four years of intensive investigation. Although these researchers were not active on the forest in 2001 their research continues to contribute to our understanding of the paleoecology and archaeology of the Tongass. Dixon is organizing a symposium for the 2002 Society for American Archaeology annual meetings dedicated to "Interdisciplinary Research and Tribal Involvement at 49 PET 408".

In 2001 Tim Heaton expanded his exploratory research to the caves of Coronation Island as part of the Wilderness Monitoring project sponsored by the Thorne Bay District. Heaton has submitted a proposal to the National Science Foundation to expand paleontological investigations to other parts of the Tongass. He has prepared a comprehensive Internet website (http://www.usd.edu/esci/alaska/), providing many details of his past research and future goals. That site highlights the contribution of the various partners in cave research on the Tongass.

The Prince of Wales Island zone archaeologist provided assistance and oversight to a British Broadcasting Corporation (BBC) film crew producing a documentary of changing environments since the last Ice Age. Local Alaska Native actors were hired to portray the hypothetical first occupants of Southeast Alaska some 14,000 years ago. The crew filmed scenes at 49 PET 408 and at nearby beaches. The BBC production is expected to air in fall 2002 in Europe and December 2002 on the Discovery Channel in the U.S.

Similarly, Margarita Borda (Sunshine Productions) continues to work on a documentary film chronicling the cross-cultural investigations at 49 CRG 231 (Pictograph Cave). This work derives from 2000 fieldwork at Pictograph Cave conducted in partnership with the Craig Ranger District, the Klawock Cooperative Association (federally recognized Indian tribe), University of Alaska-Anchorage and Western Washington University. The resulting film will showcase the cooperative efforts among the partners and provide valuable insights into Northwest Coast rock art. Jim Keyser (FS Region 6) is publishing an "Overview of Northwest Coast Rock Art" (expected in print in 2003), which will contain a chapter about Pictograph Cave. Keyser is organizing a Rock Art Symposium for the 2002 Society for American Archaeology annual meetings. Five symposium papers will discuss aspects of the 2000 Pictograph Cave project.

Madonna Moss and Jon Erlandson (University of Oregon) are continuing their analysis of archaeological investigations from the Cape Addington Rockshelter and Seumez Island Caves.

They have spent several hundred hours beyond the fieldwork, on the analysis and description of collected materials. Drs. Moss and Erlandson have published their results in the *Canadian Journal of Archaeology*, *American Antiquity*, and the *Journal of North American Archaeology*. Some of these results may be seen on Dr. Moss' Internet website through the University of Oregon (http://www.uoregon.edu/~mmoss/gatemm.htm).

The City of Klawock received a $10,800 grant from the Forest Service Civil Rights program to assist with the replication of a totem pole in the Klawock Totem Park. The park was initially developed as a cooperative Civilian Conservation Corps project, administered by the Forest Service in the late 1930s.

Volunteers helped Petersburg Ranger District archaeologists monitor ancient fish traps and a campsite and an historic period cabin site. The group updated existing site maps, collected samples for radiocarbon dating and performed test excavations at the campsite. Aside from exposure to archaeological technique, the volunteers learned about ancient life ways of the local Alaska Native culture and were instilled with an appreciation of the non-renewable and often fragile nature of the archaeological record. A volunteer is currently analyzing the specimens collected from the campsite excavations and those collected last year during a PIT project. This analysis will yield important information about harvested subsistence species, the season's of site use and the site's age.

Archaeologists from the Petersburg Ranger District and Petersburg Supervisor's Office organized and participated in a field trip to a significant cultural site with staff and council members from the Organized Village of Kake (federally recognized tribe). The group visited the site with both archaeological and spiritual goals in a successful effort to work closely and cooperatively with the tribal government on a non-compliance project. Another cooperative project with the Organized Village of Kake involved the mapping of an historic period cemetery that also serves as the community's contemporary cemetery. The Petersburg District archaeologist and other Forest Service employees made a detailed map of Grave Island, which lies offshore of Kake. The map is accompanied by photographic documentation of the unique headstones and a listing of all those buried. In addition to documenting the site for posterity, the map and additional information will help Kake and the Forest Service make future management decisions regarding the island.

This fiscal year saw the conclusion of an 18-month program with an International Trainee from England. The Sitka Supervisor's Office arranged for the trainee to volunteer on the Tongass from July 1999 through October 2000. We were able to provide this individual with a wide variety of work experience from working with PIT volunteers on a variety of projects to ultimately conducting fieldwork on historic sites and writing Section 106 compliance reports for the forest. He was able to use new skills that he acquired while working for the Tongass, which he was able to use on his next project in Ireland. Working through the International Trainee program offers great rewards for both the trainee and the Forest Service.

Evidence suggests that interpretative and educational programs are effective in strengthening the public's commitment to heritage resource preservation and protection. Tongass archaeologists made numerous classroom presentations throughout the school year, and completed outreach projects in cooperation with the University of Alaska-Southeast and other academic institutions. Public outreach leads to stewardship when the Forest visitor takes an active role in protecting sites. People protect what they understand and value. We reach thousands of people each year with the message that heritage resources are fragile, non-renewable resources and if protected can yield important information about past cultures and environments.

We are also taking steps to proactively manage the forest's significant heritage resources. Two projects begun in 2001 are designed to outline management strategies for two distinct types of heritage resources; historic mines and culturally modified trees. The Alaska Region has contracted for an assessment of mining development that occurred between 1850 and 1950. This report, still in draft form, provides a historic background of mining activity and criteria for determining eligibility of mining sites to the National Register. This information will be useful for

expediting heritage resource management decisions in anticipation of future clean up of remaining hazardous materials at abandoned mines.

The Tongass forest archaeologist wrote a draft culturally modified tree (CMT) management plan in 2001. CMTs are perhaps the most common visible signs of Southeast Alaska's occupation by Alaska Native peoples. The study of CMTs can provide answers to important questions about chronology, technological development, subsistence, seasonality, settlement patterns, land-use patterns and regional trade and interaction. As a cultural resource class, precedence for their inclusion in the National Register has been established. The draft CMT management plan presents a management strategy that includes suggested inventory procedures, recording methods, criteria for determining National Register eligibility and a range of preservation and mitigation standards. The plan incorporates detailed CMT attribute data collected from inventory of over 10,000 acres of the Tongass. During the 2001/2002 Winter we intend to solicit comments on the draft plan from Indian tribes, Alaska Native people and others interested in CMT management. We have also identified the need for future management plans dealing with other heritage resource sites, such as ancient shell middens, historic cabins and canneries.

Evaluation of Results

The USDA Forest Service - Alaska Region has developed heritage resource management procedures to efficiently and economically carry out its obligations under Sections 106 and 110 of the National Historic Preservation Act. These procedures are outlined in a programmatic agreement that is currently being revised. Archaeological inventory is prioritized by the likelihood of locating heritage resource sites. This likelihood is based upon an area's physical, biological and cultural features and known history. The Tongass National Forest recognizes two archeological sensitivity zones, high and low. Archeological inventory for proposed activities is concentrated primarily in the high sensitivity zones. However, some inventory is also conducted within areas of low sensitivity. The sensitivity zones are subject to refinement as new information becomes available and the zones are flexibly applied in the field. Post-project monitoring on roads and within other activity areas is accomplished to verify the assumptions of the sensitivity model and to determine whether heritage resources are present but not revealed by standard inventory techniques.

We should continue heritage resource monitoring to ensure that Forest Plan standards and guidelines are continually met. In the past four years we have made significant progress in implementing standard monitoring procedures and increasing the number and frequency of monitoring inspections. However, we have only inspected a few of the total number of heritage resource sites on the Forest. The total number of damaged sites that have been stabilized is few. Funding and personnel limit additional stabilization, and/or data recovery efforts. The monitoring questions are relevant and elicit information that is essential for monitoring Forest Plan objectives.

Heritage Resources Question 2: Are Heritage Resources standards and guidelines effective in protecting heritage/cultural resources as expected in the Forest Plan?

The Forest Plan standards and guidelines are effective in meeting resource objectives, i.e. site protection and preservation.

Monitoring Results

<u>Project Implementation</u>

Current evidence suggests that Forest Plan standards and guidelines are effective in protecting heritage resources. The Tongass National Forest has a strong record of compliance with Section 106 of the National Historic Preservation Act (NHPA). During FY 2001, Heritage Program staff evaluated 60 undertakings for their potential to affect heritage resources eligible to the National Register. Avoidance of project impacts has been an effective mitigation approach.

Project Inventory/ Clearance

Overall the Tongass National Forest meets our legal compliance requirements and completes heritage resource effects analysis prior to making a NEPA project decision. We have developed an effective system to ensure that every undertaking is considered for its effects to heritage resources. Our challenge is to maintain this level of effectiveness as new employees, some with no knowledge of legal compliance requirements of heritage resource laws, take responsibility for programs that result in undertakings as defined by Section 106 of the NHPA. Ongoing internal education with key staff groups is crucial in this effort.

Mitigation

Site monitoring suggests project mitigation measures are effective in protecting heritage resources eligible to the National Register. The site monitoring is very detailed in some cases and specifically details how the site should be monitored for natural and human-caused effects.

Monitoring Results

Tongass archaeologists monitored the condition of 167 heritage resources, many times in conjunction with project inventory (Table 2-17). In addition to monitoring sites on National Forest System lands, we regularly inspect sites on State tidelands and Alaska Native corporation lands (regional and village) as a courtesy and to gauge the overall level of site impacts. Archaeologists noted natural or human-caused impacts at 20 sites, eight of which are completely or partly on National Forest System lands. The remaining 147 sites appear to be in a state of natural decomposition with no evidence of accelerated natural erosion or human damage. Evidence of recent vandalism at sites on National Forest System lands was noted at only two sites; one of which is the subject of an open Archaeological Resources Protection Act investigation.

Archaeologists noted accelerated erosion at four ancient fish weir sites on Prince of Wales Island State tidelands (49 CRG 280, 49 CRG 433, 49 PET 187 and 49 PET 206). At each site, wooden stake fish weirs are rapidly eroding as a result of lateral channel migration and stream bank erosion. Extensive timber harvest has occurred in all four of these watersheds (Snooze Creek, Red Bay, Staney Creek and Thorne River). Although unsubstantiated, one possible explanation is that accelerated runoff resulting from timber harvest has hastened the erosion of these weirs. Frequent monitoring of these sites in recent years has yielded considerable data about the site's features. However, in these cases the pace of erosion exceeds our ability to salvage important information.

Vandalism to heritage resources occurs primarily in the form of illegal artifact collecting and excavation of buried cultural items. The Archaeological Resources Protection Act (ARPA) states that people may not "excavate, remove, damage, or otherwise alter or deface any archaeological resource located on public lands or Indian lands…" unless that activity occurs under terms of a permit. Evidence of vandalism was noted at 13 sites, four of which are completely on National Forest System lands (49 CRG 019, 49 CRG 093, 49 CRG 136 and 49 CRG 390) and one that is partly on National Forest System and Sealaska Corporation lands (49 CRG 096). Two of the five sites on National Forest System lands show evidence of vandalism within the last five years. One of these (49 CRG 093) is the subject of an open ARPA investigation. The other (49 CRG 019), an historic mine, shows evidence of people collecting bottles and ceramic artifacts. The other three sites on National Forest System lands do not appear to have been vandalized within the last five years. The other sites with evidence of vandalism are on State lands (49 CRG 081 and 49 CRG 165), and lands owned by Sealaska Corporation (49 PET 038, 49 PET 107, 49 CRG 041, 49 CRG 143 and 49 CRG 096); an Alaska Native village corporation (49 CRG 063) and a private owner (49 PET 222). These sites tend to be the larger and more visible types of sites, such as abandoned villages, that are affected by intentional looting of artifacts or inadvertent damage from recreation activities close to modern communities. We have shared our monitoring observations with the appropriate landowners.

One individual was convicted of an ARPA violation in September 2001. This is the first ARPA conviction in Alaska. An ARPA investigation at 49 CRG 093, near Klawock remains open. The

Craig Ranger District received initial reports of vandalism to the site in 1999. Minimal progress has been made on the case in 2001, however frequent monitoring of the site continues.

Three of the monitored sites exhibited damage caused by previous Forest Service projects (Table 2-16). At two sites (49 PET 129 and 49 CRG 211) damage occurred over 20 years ago during timber harvest. The third site (49 CRG 460), an ancient shell midden, was damaged during construction of a latrine at a Forest Service recreation cabin. Archaeologists conducted test excavations in 1996 to mitigate the damage and assess the site's extent for future cabin facility needs. There is no evidence that Forest Service activities have lead to site damage since implementation of the Forest Plan standards and guidelines.

Table 2-16. Results of the FY 2001 Tongass National Forest Heritage Program Monitoring Efforts

Sites Monitored	Sites Eroding Normally	Sites with Accelerated Erosion	Sites Vandalized	Sites Damaged from Previous Forest Projects
167	147	4	13	3

The statistical results of the FY 2001 monitoring program indicate that of the 167 sites monitored, about 88 percent are either undisturbed or deteriorating from natural processes (e.g. organic decomposition, soil compaction), while about two percent of the sites are being impacted from accelerated erosion. Archaeologists noted vandalism at about eight percent of the monitored sites, while two percent of the monitored sites exhibit damage from previous Forest Service activities. Most of the human-caused damage occurred prior to implementation of the Forest Plan standards and guidelines for heritage resources. Evidence suggests the standards and guidelines have been effective in reducing the level of human-caused damage to heritage resources.

Evaluation of Results

The Forest Plan standards and guidelines are being implemented and they do appear to be effective in meeting resource objectives, i.e. site protection and preservation. There is a need, however, to continue heritage resource monitoring to ensure that the standards and guidelines are continually met. We have in the past four years made significant progress to develop standard monitoring procedures and increase the amount of monitoring inspections. However, we have inspected only a relatively few of the Forest's heritage resources. The total number of damaged sites that have been stabilized is few. Limited amounts of funding and personnel restrict additional stabilization and data recovery. The Forest Plan monitoring questions are relevant and elicit information that is essential for monitoring Forest Plan objectives.

The Tongass heritage program team has adopted the philosophy that site protection is best served through education and public outreach, fostering a fuller appreciation of the values embodied in the archaeological record and thus recruiting the public as active stewards of heritage resources. Delineating this philosophy, the Forest's archeologists are increasingly working with public school students, contributing to the development of college curricula (through the University of Alaska Southeast and other institutions), and sharing new discoveries at community functions and at public facilities. Through programs such as Alaska Archaeology Month and Passport in Time, archeologists have connected with thousands of forest visitors who now have a better appreciation of the value of heritage resources and our approach to their management.

The public has enthusiastically embraced these outreach and education efforts, which have resulted in notable successes in public stewardship. The community of Coffman Cove, for example, is actively seeking funds to protect and interpret an archaeological site within the city. Point Baker and Port Protection residents have supported Forest-sponsored archeological investigations at one of the most ancient sites in coastal Alaska, hosting presentations and potlucks in their communities.

These significant successes create a growing demand. With information comes interest; with interest comes a desire to be involved as well as a demand for more information. We have

planted the seeds of stewardship, and promised to share information through the classroom and through volunteer programs. We need to keep our promises to make the program work as well as to keep the support of the teachers and students and volunteers we have enlisted. We need to be able to go to the classrooms, when called upon. We need to continue to offer avenues through which local and non-local volunteers can participate in heritage resource management. We need to continue to reach new generations of students with the values of learning from and about the past.

All signs point toward a closer relationship between Native Americans and archaeologists in the management of heritage resources and the conduct of archaeological research. New regulations implementing the National Historic Preservation Act require much closer and sustained consultation at all levels of project planning. The ongoing process of repatriation and consultation under the Native American Graves Protection and Repatriation Act bring federal agencies and tribes into close contact. At the same time, in Southeast Alaska, Sealaska Corporation is attempting to begin an active management program for its 85 historic and cemetery sites acquired through the historic and cemetery sites provisions of the Alaska Native Claims Settlement Act (ANCSA 14(h)(1)). Sealaska seeks to work with clans and tribes to develop plans to manage these sites and to influence the management of historic and archaeological sites on other lands (federal, state, private). The overlap in mission between the Tongass National Forest and Sealaska Corporation presents partnership opportunities.

A significant step forward in management of heritage resources in Southeast Alaska would be to develop agreements for cooperative management of historic and archaeological sites in the region. Working together, clans, tribes, corporations, and federal and state agencies could more effectively learn from and protect these important cultural places.

Table 2-17. Tongass National Forest Heritage Resource Sites Monitored in FY 2001

USGS QUADRANGLE	NUMBER of SITES EXAMINED
BRADFIELD CANAL	1
CRAIG	45
JUNEAU	8
KETCHIKAN	43
PETERSBURG	32
PORT ALEXANDER	19
PRINCE RUPERT	1
SITKA	3
SUMDUM	15

Karst and Caves

Goal: Maintain and protect significant karst and cave ecosystems Forest-wide.

Objectives: Allow for the continuation of natural karst processes. Maintain the productivity of the karst landscape while providing for other land uses where appropriate.

Background: The Tongass National Forest contains the largest concentration of dissolution caves known in the State of Alaska. The Forest also contains world-class surface or epikarst features particularly in the alpine and sub-alpine zones. The caves and epikarst features result from chemical weathering of limestone and marble bedrock. The karst and cave features and associated resources are a recently discovered and recognized attribute of the lands within southeastern Alaska and have been found to be of national and international significance for a wide variety of reasons, including their intensity and diversity of development, the biological, mineralogical, cultural, and paleontological components, and recreational values.

The Federal Cave Resources Protection Act (FCRPA) is the primary U.S. law affecting caves. It requires protection of significant caves on Federal lands. A cave must possess one or more of the criteria outlined in 36 CFR Part 290.3 to be determined "significant." Though "non-significant" caves may exist, most meet the criteria for "significant." The intent of this act is to protect cave resources, not karst resources. However, it is important to recognize that caves and associated features and resources are an integral part of the karst landscape. Karst must be managed as an ecological unit to ensure protection of the cave resources.

Current projects with Records of Decision (RODs) signed after the Forest Plan Revision focus on karst area protection. New Forest-wide standards and guidelines require that areas of high vulnerability karst within the project area be deleted from land considered for harvest. Karst lands included in project areas are typically low or moderately low vulnerability karst. The new standards and guidelines will be implemented in upcoming projects such as Staney, Tuxekan, Kosciusko, Otter Lake, Suemez, Gravina, Licking Creek, logjam, and Cobble timber sale projects. Interim guidelines for karst and caves were implemented on the Heceta Sawfly Project, since the Record of Decision for this project was signed before the revised Forest Plan Record of Decision was signed. Heceta Sawfly had a NEPA decision that was in category 1, Approved NEPA and Implemented Sale.

Karst and Cave Question 1: Are Karst and Cave standards and guidelines being implemented?

Monitoring was completed on projects falling under interim standards and guidelines for karst and caves, as well as projects implemented under the direction of the standards and guidelines in the revised Forest Plan. Work completed under the revised Forest Plan Karst and Cave standards and guidelines included preliminary inventory, cave inventory and mapping, timber unit and road reconnaissance, timber unit layout, and road layout. The standards and guidelines were implemented to the fullest extent practicable.

Monitoring Results

The Karst and Cave standards and guidelines outlined in the Forest Plan were implemented to the fullest extent practicable.

<u>Project under the interim Karst and Cave Standards and Guidelines</u>

Heceta Sawfly Salvage Sale: In 1998, a re-evaluation of the application of the Karst and Cave standards and guidelines on the project resulted in a modification to the acreage of this timber sale after it was sold. Of the 511.7 acres of timber harvest planned, the evaluation identified 52.55 acres (10 percent) of the existing harvest units that should be deleted to fully meet the requirements of the interim standards and guidelines. An additional 10-15 acres were excluded due to subsequent discoveries. Harvest of the sale has been completed. All units have been yarded and the harvested timber transported to the LTF and barged. Monitoring focused on the

implementation and effectiveness of yarding prescriptions, stabilization of cut slopes associated with roads, and windfirmness of harvest unit edges and the small buffers surrounding karst features. Special focus was given to effectiveness of yarding techniques used in the harvest of the partial cut prescriptions.

<u>Projects under the Forest Plan Karst and Cave Standards and Guidelines</u>

DEIS or FEIS input into Cholmondeley, Moria, Otter Lake, Staney, Licking Creek, Log Jam, Cobble, Gravina Island, Suemez Island, Tuxekan Island and Kosciusko Island Project Planning: Efforts were made to insure that the karst and cave standards and guidelines were implemented in the planning of these projects, and that they will be implemented on the ground. Implementation was completed through resource specialists' actions in the planning process, following discussions with contractors and review of their findings, design and analysis of dye trace programs, on-the-ground inventory, resource report writing, writing or review of resource sections of the DEIS or FEIS for the projects, and answering public comments. On the Kosciusko Island Project, completion of the DEIS approaches. The Final Karst Vulnerability Assessment has been reviewed and the Watershed assessment is still in Draft form as of the writing of this report. The original Unit pool was greatly modified as a result of the karst resource inventories placing the high vulnerability areas in reserves. The Tuxekan Island Project lags behind the Kosciusko Island Project in completion but the inventories have been completed and karst vulnerability determined. During the fall, a comprehensive dye trace study was conducted on Tuxekan Island. Nearly 100 resurgences or creeks along the shore or Island's interior were identified and pH, conductivity, temperature, and physical characteristics recorded. Then Dye was injected at 14 places in the interior of the Island. Analysis of the charcoal packets placed in the streams and springs showed that the 14 dye injections flowed to some 25 sites on the coast. This analysis will greatly change the watershed boundaries on Tuxekan Island and therefore the Watershed Assessment. Field reconnaissance and inventory was conducted on the proposed Licking Creek unit pool and a resource report completed identifying the vulnerability of the karst resources found there. One incredible cave system was found within one of the marble units that will be inventoried in the summer of 2002.

Evaluation of Results

<u>Project under the interim Karst and Cave Standards and Guidelines</u>

Heceta Sawfly Salvage Sale: The Heceta Sawfly Salvage Sale units have been harvested, yarded, the logs transported and barged from the Island, and the sale closed. The implementation of the karst standards and guidelines is dependent upon the effectiveness of the harvest and road construction and the remaining trees and buffers remaining windfirm.

The effectiveness of the yarding and harvest prescriptions, road construction, and karst mitigation were monitored in Units 14, 19 and 20 as described below:

Harvest Unit 14: As laid out, harvest unit 14 was approximately 50 acres in size. Two additional karst features were identified during harvest and removed from the harvest unit. The unit was laid out as a partial cut with individual tree mark. Partial suspension was required. We inspected the yarding corridors and the remaining timber within the unit. All of the yarding corridors had been brushed in and hand seeded. The road has been closed. We discussed pulling the log stringer bridges spanning several of the karst features at the next opportunity. Minor windthrow was noted adjacent to the road and within the harvest unit. The seeding of the cutbanks was successful. Karst management objectives will be met if the remaining timber within the harvest unit remains wind firm.

Harvest Unit 19: As laid out, harvest unit 19 was approximately 30 acres in size. The unit was laid out as a partial cut with individual tree mark. Prior to harvest, the sale administrator and the Forest geologist located the temporary roads within the unit and re-flagged the buffers surrounding several karst features. Partial suspension was required. The yarding corridors have been seeded and brushed in and the roads closed. The effectiveness of the harvest prescriptions and the windfirmness of the remaining trees in the partial harvest units and karst buffers were

evaluated. The majority of the remaining trees were still standing at the summers end. Karst management objectives will be met if the remaining timber within the harvest unit remains wind firm.

Harvest Unit 20: As laid out, harvest unit 20 was approximately 23 acres in size. The unit was laid out as a partial cut with individual tree mark. Prior to harvest, the sale administrator and the Forest geologist located the temporary roads within the unit and re-flagged the buffers surrounding several karst features. Several other karst features were found just prior to harvest and appropriate buffers flagged to protect these features and the sinking streams. Partial suspension was required. The yarding corridors have been seeded and brushed in and the roads closed. The effectiveness of the harvest prescriptions, the windfirmness of the remaining trees, the temporary road corridors, and karst buffers were evaluated. In the western half of the unit a short temporary spur road was constructed to access the timber harvest. After the road construction, wind thrown timber was removed north of the road and a deep sink uncovered. This sinkhole was missed during unit inventory and layout due to its location under the wind thrown trees. The standards and guides to protect this one karst feature were not fully implemented. The current buffer surrounding this feature is too small and the proximity of the road to the feature too close to meet the standards and guidelines. The feature was discovered after the road had been constructed. Resource damage was minimal because of the minimal yarding distance adjacent to the feature and the recognition of the feature by the logger as soon as it was uncovered. The monitoring group discussed seeding of the site and possible ideas on how to ditch the temporary road as not to interrupt the flow of surface water into the karst feature nor add sediment into the karst groundwater system.

The monitoring group discussed the need to set up permanent transects in these harvest units to monitor the effectiveness on the timber harvest prescriptions and the karst mitigation. If funded, the Forest plans on creating these transects during the summer of 2002. Heceta Island was contracted to be flown by LIDAR during the spring and summer of 2001. LIDAR (Light Distancing And Ranging) is a method of generating high resolution Digital Elevation Models (DEM) and high-resolution orthorectified photographs for the subject area. Weather was not conducive to LIDAR flights and the contract was not completed. The remainder of the Island is to be flown this spring. Working with the USGS in Anchorage, the geology map of the Island will also be updated. Then the vulnerability of the karst resources on the Island will be determined and mapped using field inventories, LIDAR DEMs, and the updated geology layer.

Projects under the Forest Plan Karst and Cave Standards and Guidelines

DEISs and FEISs: Karst areas are included in the proposed harvest areas of the Cholmondeley, Moria, Logjam, Cobble, Staney, Tuxekan, Kosciusko, Otter Lake, Suemez, Gravina, and Licking Creek Timber Sale projects. These areas were inventoried or are in the process of being inventoried, and the proposed unit pool modified to protect the karst and cave resources. An effort was made to protect the function and integrity of the karst systems, rather than individual features. LIDAR generated DEMs planned for some of these projects will aid in these inventory efforts. However, timely delivery of these high resolution DEMs given the unpredictable weather has resulted in the data collection lagging behind current analysis schedules.

A Draft Tongass National Forest Land and Resource Plan Implementation Policy Clarification for Karst Management Standards and Guides process has stalled with the added responsibilities of the Forest Geologist with the unification of the Tongass and the loss of key personnel. Those key positions have just been filled and completion of this clarification statement will be a priority.

The Tuxekan and Kosciusko Island projects are moving towards the completion of the DEIS. Resource reports have been completed and reviewed. On the Licking Creek Project the geology of the project area and the surrounding areas adjacent to the Shoal Cove road system were mapped. This data combined with air photograph interpretation has been digitized into the GIS database. LIDAR data was never acquired for this planning area as expected. Field reconnaissance and inventory was conducted on the proposed Licking Creek unit pool and a resource report completed identifying the vulnerability of the karst resources found there. One incredible cave system was found within one of the marble units, which will be inventoried in the summer of 2002.

The Ketchicave Expedition on Kosciusko Island was held this summer. Volunteers from around the world worked for 4 weeks on the island mapping and inventorying some 25 caves. The final report of this exploration is nearing completion. The discoveries of this group of volunteers will be incorporated in to the design of the alternatives in the Kosciusko Island EIS. Communication remains good between the Tongass and the Glacier Grotto.

It is imperative that vulnerability classification of karst lands be conducted before timber harvest is planned. The most sensitive areas or those of high vulnerability should be identified and removed from the suitable lands base before harvest units are proposed. At least two years are needed prior to project planning to delete the gross, karst hydrology of an area through dye tracing. The Kosciusko and Tuxekan Island efforts are an example of well-planned timing.

Karst and Caves Question 2: Are karst and cave standards and guidelines effective in protecting the integrity of significant caves and the karst resource?

Monitoring included only one project that followed interim standards and guidelines for karst and caves, since projects following the karst and cave standards and guidelines in the revised Forest Plan have not been implemented on the ground to date. The monitoring indicates that the interim standards and guidelines for system protection are effective. It is not possible to determine if the standards and guides for Karst and Caves in the revised Forest Plan are effective until additional monitoring is completed.

Only the Heceta Sawfly Salvage Sale Project was monitored. Heceta Sawfly was a timber sale that implemented interim standards and guides prior to the implementation of the Revised Forest Plan.

Monitoring Results

The 2001 effectiveness monitoring focused on one area as described below:

Heceta Sawfly Salvage Sale: The Heceta Sawfly Salvage Sale is complete. This island is characterized by catastrophic wind throw events. The effectiveness of the karst standards and guidelines is dependent upon the success of the harvest prescriptions and design and mitigation measures for road construction.

The effectiveness of yarding restrictions and buffer design were monitored. The majority of the remaining timber in the stands monitored remained intact at the close of the FY 2001 season. Harvest Unit's 14, 19, and 20 were monitored as well as the road systems. Future monitoring efforts will be focused on the success of the prescriptions in all units and the windfirmness of the remaining forest and associated buffers. The monitoring group discussed the need to set up permanent transects in these harvest units to monitor the effectiveness on the timber harvest prescriptions and the karst mitigation. If funded, the Forest plans on creating these transects during the summer of 2002.

Evaluation of Results

The karst and cave management standards and guidelines, where applied were shown to be effective in protecting the integrity of significant caves and karst resources. One area was identified where the standards were not fully applied. Mitigation to remedy the situation have been designed and will be implemented in 2002.

Monitoring of karst and cave systems adjacent to timber harvest units and roads indicate that past harvest activities and road construction implemented prior to the new standards and guidelines, may have contributed to changes in the karst hydrology of the systems, and introduced sediment and debris into some cave systems. Monitoring of the effectiveness of the implementation of the standards and guidelines over the past few years has shown the need for clarification of the implementation procedures and identified changes to the standards needed. These changes were implemented in the Licking Creek, Kosciusko and Tuxekan Island Projects but the clarification statement has yet to be completed. This will be a priority for 2002.

While the revised Forest Plan standards for karst and cave resources were implemented in the Heceta Sawfly Project Area, they focused on feature protection and not system protection. The standards required were implemented and the project offers a good opportunity to monitor the effectiveness of applied prescriptions and mitigation. As previously mentioned, harvest of the sale is completed. Monitoring efforts will focus on the success of the prescriptions in those units and the windfirmness of the remaining forest and associated buffers.

Land Management Planning

Background: The Forest Service policy and direction for improvement of government-to-government relationships, and collaborative, community-based resource stewardship establishes a goal of compatibility of Forest Service management activities with the goals and objectives of adjacent lands. In addition, 36 CFR [219.7(f)] requires that a program of monitoring and evaluation shall be conducted that includes the effects of National Forest management on lands, resources, and communities adjacent to or near the National Forest project or activity being planned. Effects upon National Forest land from activities on nearby lands managed by other Federal or other government agencies or under the jurisdiction of local governments will also be monitored and evaluated.

Land Management Planning Question: Is the management of National Forest System lands consistent with management objectives of adjacent lands and their management plans?

Monitoring Results

National Forest management projects with decisions completed in FY 2001 have been evaluated to determine if any non-National Forest lands are adjacent to the project locations. Projects that have been appealed and decisions remanded during the 2001 fiscal year were not evaluated.

The projects identified as having adjacent non-National Forest System lands are listed below, along with details on the type of project, management objective, and consistency determination between the management objectives on the National Forest land and adjacent lands. Lands identified as being adjacent are within a distance that could possibly be influenced by the project.

<u>Ketchikan-Misty Ranger District</u>

<u>Harriet Hunt Firewood Sale</u>

The Harriet Hunt firewood sale is along the Ketchikan road system, and about nine miles north of Ketchikan. It consists of one harvest unit, approximately 4 acres, of down and near dead wood that will be sold commercially as firewood. This project area is located in a Timber Production LUD.

Non-National Forest Lands: This project is adjacent to private land. This project is fully compliant with the management of non-National Forest lands.

<u>Petersburg Ranger District</u>

<u>Woodpecker Project Area Record of Decision</u>

The Woodpecker Project Area is located on Mitkof Island, approximately 27 miles south of Petersburg, Alaska encompasses approximately 33,000 acres. Project area LUDs consist of Timber Production, Modified Landscape, Scenic Viewshed and Old-growth Habitat.

Non-National Forest Lands: About 12 percent of the project area is non-National Forest lands of which less than 1 percent is private the remaining is State land. This project is fully consistent with the management of adjacent non-National Forest lands.

<u>Thorne Bay Ranger District</u>

<u>FY 2001 Precommercial Thinning Project</u>

This project approves precommercial thinning on Prince of Wales Island. It will thin overstocked second growth stands in order to promote the diameter and height growth of the largest, best formed trees within a stand. The sites are located within six Visual Comparison Units (VCUs), which have been assigned Timber Production and Old Growth habitat.

Non National Forest Lands: One unit is adjacent to state lands. This project is fully consistent with the management of adjacent non-National Forest lands.

Cedar Decline 2000

This project approves 298 acres for up to seven salvage sales on Prince of Wales Islands of dead, dying and wind throw timber cedar trees. These sales will contribute to the economic stability of local communities. Old-growth Habitat and Modified Landscape LUDs are found in this project area.

Non National Forest Lands: Some of these sale's units are next to State land in the El Cap area. The project is fully consistent with the management of adjacent non-National Forest lands.

Wrangell Ranger District

Special Use Authorization for Sixteen Isolated, Research and Pre-ANILCA Cabins

A total of sixteen cabins received authorized continued use for the next five years. Of these sixteen cabins, eight are isolated cabins permitted for personal recreation use; three are Administrative and Fisheries Research cabins, and the remaining three are pre-ANILCA trespass cabins that are permitted for traditional and customary activities but are not permitted for private recreational uses. Fourteen of these cabins are located in the Tongass Land and Resource management Plan as having a Land Use Designation of Wilderness (WW), on is located in a Scenic Viewshed, and the remaining is in a semi-remote recreation designation.

Non-National Forest Lands: Of these sixteen cabin locations, two are located adjacent to private land. These projects are fully consistent with the management of adjacent non-National Forest lands.

Evaluation of Results

There were no projects that were inconsistent with non-National Forest land during 2001. This has been the trend for the past three years.

Local and Regional Economics

Goal: Provide a diversity of opportunities for resource uses that contributes to the local and regional economies of Southeast Alaska.

Objective: Work with local communities to identify rural community assistance opportunities and provide technical assistance in their implementation. Support a wide range of natural resource employment opportunities within Southeast Alaska's communities where economically viable.

Background: The Tongass National Forest comprises about 90 percent of Southeast Alaska's total land base. The 33 communities within Southeast Alaska use and depend on Forest resources for economic opportunities, quality of life, traditions and cultures, and recreation activities. Forest management decisions can have significant impacts, positive and negative, on these communities.

Question 1: Are the effects on employment and income similar to those estimated in the Forest Plan?

Data Collection: Annually summarize estimates of the natural resource employment and income estimates from the Alaska Department of Labor employment and earnings data. Compare these annual estimates with those estimated in the Forest Plan.

Evaluation Criteria: Effects of Forest Plan implementation on employment and income by resource sector.

Precision and Reliability: Employment and income statistics for resource industries are difficult to collect for several reasons. Alaska Department of Labor employment and earnings statistics do not include self-employed persons. Most commercial fishers, many loggers, and tourism-related operations are not reflected in State data. The U.S. Bureau of Economic Analysis income and employment data does include self-employed persons, but it is not reported in the detail necessary to break out each resource-industry. In addition, State disclosure laws relating to income prevent the Alaska Department of Labor from releasing detailed figures, resulting in several gaps in the analysis.

Employment and earnings data is collected and reported by industry sectors. Every business operation has an assigned industry code for which data is reported to the State. In the case of the Recreation and Tourism sector, no single industry code exists, but it is made up of many different services and retail trade operations. The amount of business activity directly related to recreation and tourism activity is not easily available from the reported data. Recreation and Tourism figures for Forest Plan analysis were estimated using non-agriculture wage and salary employment data (not inclusive of self-employed), IMPLAN modeling output, and survey data. The data presented for this monitoring report are not directly comparable to the estimates in the Forest Plan, but are included for general trend analysis of the industry.

A similar situation exists with commercial fishers. Because most of them are self-employed, their earnings are not reflected in State data reports. The Forest Plan assumed any significant impacts to salmon fisheries would not be related to Forest management activities (see the 1997 Forest Plan FEIS, page 3-491). The employment and earnings data for seafood processing has been presented as an analysis of general trends in the commercial fisheries industry rather than a direct comparison of Forest Plan estimates.

Monitoring Results

Monitoring results are shown in the following tabular Forest Plan estimates and the Alaska Department of Labor employment and earnings data (Tables 2-18 and 2-19).

Analysis: Describe and explain the difference between the Forest Plan estimates and actual employment and earnings data.

Table 2-18. Forest Plan Estimated Employment and Earnings for Southeast Alaska, Annual Equivalent [1]

	ASQ		NIC 1	
Employment Sector	Jobs	Earnings ($ millions)	**Jobs**	Earnings ($ millions)
Wood Products	1,724	77	1,379	32
Recreation/Tourism	3,698	117	3,698	117
Salmon Harvesting [2]	--	--	--	--
Mining	810	49	810	49
Southeast Alaska Total	**41,416 [3]**	**1,324 [3]**	**5,887**	**198**

1. Forest Plan estimates are from the 1997 FEIS, Table 3-140. NIC I estimates for wood products are 80% of the ASQ total.
2. The Forest Plan did not measure impacts to Salmon Harvesting or Seafood Processing because much of the changes in the industry are not influenced by Forest Service activity; see 1997 Forest Plan FEIS pages 3-491 for details.
3. Employment and earnings in all sectors.

Table 2-19. Reported Southeast Alaska Employment and Earnings, Annual Equivalent (Non-agriculture Wage and Salary [NAWS] Employment and Earnings1), Years 1995 through 2000

	Jobs/ Earnings ($ millions)					
Employment Sector	1995	**1996**	**1997**	1998	1999 [4]	2000 [5]
Wood Products	2,069 95	1,740 79	1,456 75	1,221 57	1,156	1,074
Retail and Services [2]	12,594 242	12,702 252	12,830 254	13,006 263	13,453	13,623
Seafood Processing [3]	1,587 40	1,326 36	1,444 34	1,289 33	1,491	1,487
Mining	189 12	273 18	331 22	337 23	318	309
SE Alaska Total	**35,452 1,083**	**35,643 1,077**	**35,571 1,080**	**34,954 1,071**	**36,339**	**35,792**

1. NAWS data includes all full- and part-time wage and salary employment; this does not include any self-employed persons.
2. Retail and Services includes all employment and earnings in these sectors, not just those associated with Recreation and Tourism. This category is used to present general trends of the sectors rather than direct comparisons.
3. Seafood processing is presented to highlight general trends of the commercial fishing industry rather than direct comparisons with the Forest Plan. Salmon harvesting data is not available because the majority of commercial fishers are self-employed and their earnings are not counted by the Alaska Department of Labor.
4. In 1999 and 2000, financial figures have not all been broken down for individual job categories.
5. 2000 figures are preliminary.

Wood Products: The Forest Plan employment and earnings figures include activities associated with private, State, BIA, Forest Service, and Native Corporation timber harvesting. The figures associated with the Forest Plan in Table 2-19 have been adjusted for the 1997 Forest Plan FEIS. Employment in the wood products sector currently is lower than predictions in the 1997 FEIS.

Recreation and Tourism: The recreation and tourism estimate in the Forest Plan, as explained above, was not recalculated for this analysis; instead, employment and earning figures for the Retail and Service sectors are used as a proxy of general trends. The Forest Plan estimate includes an estimate of self-employment and assumes full implementation, with all opportunities for recreation and tourism being fully developed. The employment and earnings data from the State do indicate an increasing trend in those sectors associated with tourism and recreation activities. Information more directly related to trends in the tourism industry is displayed under the Recreation and Tourism monitoring section of this report.

Commercial Fishing: Because State data do not include self-employed commercial fishing activity, seafood processing levels have been presented as a proxy for the general trends in the Fisheries industry. Current trends in seafood processing (as well as salmon harvesting) are more likely a reflection of global market conditions than Forest management activities.

Mining: The large difference in employment and earnings between the Forest Plan's anticipated levels and 2000 reported levels could be explained in terms of implementation. For the purposes of analysis, the estimates presented in the Forest Plan assume full implementation of all potential mining sites during the life of the plan, and they should thus be seen as a potential maximum under ideal market conditions, given known mineral deposits. In reality, only profitable mining sites are likely to be opened. If gold prices do not increase significantly, it is unlikely that the mining industry will ever reach employment levels estimated in the Forest Plan unless extraction costs fall or significant new deposits are discovered.

Regional: Overall, Forest Plan estimates are higher than State data, which has exhibited little to no growth in recent years. There is a significant difference between the employment levels predicted in the plan and those reported by the State of Alaska Department of Labor. Forest Plan figures, however, include an estimate of self-employed persons, and they are not directly comparable to the Alaska State data, which does not include such an estimate.

Wages: Wage estimates used in the Forest Plan were based on past wages and input/output modeling. Forest Plan wage estimates and actual wages reported by the Alaska Department of Labor (Table 2-20) are in nominal dollars. Forest Plan estimates for both wood products and mining are lower than actual wages reported by the State.

Table 2-20. Southeast Alaska Annual Average Wages, Nominal Dollars

Forest Plan		NAWS, Alaska Department of Labor [1] Earnings in Years 1995 - 1999				
			1995	1996	1997	1998[5]
Wood Products	$44,542	Wood Products	$45,839	$45,228	$51,751 [2]	$47,043 [3]
Recreation/Tourism	31,773	Retail [3]	17,584	18,345	18,045	18,459
		Services [3]	20,707	21,277	21,325	21,568
Salmon Harvesting [4]	26,418					
Seafood Processing	26,074	Seafood Processing	25,379	26,987	23,724	25,288
Mining	60,971	Mining	62,825	67,128	65,729	69,214
Southeast Alaska	30,914	Southeast Alaska	30,547	30,223	30,359	30,630

1. NAWS = Non-Agriculture Wage and Salary Earnings. This data includes all full- and part-time wage and salary employment; this does not include any self-employed persons.

2. Earnings for this year appear to include a large amount of severance pay associated with mill closures.

3. The Retail and Service sectors include more than recreation and tourism related activity. These sectors are provided to highlight general trends rather than direct comparisons.

4. Salmon Harvesting is not included in the Alaska Department of Labor data because the majority of commercial fishers are self-employed and their earnings are not counted in NAWS data.

5. 1999 figures are not broken down into specific categories for wages. Year 2000 figures are preliminary and are not shown here. Year 2001 figures are not yet available.

Recreation and Tourism estimates are significantly higher than wages reported by the State for the Retail and Services sectors. This difference is related to the assumption of full implementation of the Forest Plan, in which case all recreation and tourism opportunities would be used to provide employment and income in the future. The general increases in wages of the Retail and Services sector support the higher estimate, but it is unlikely that average Retail and Service wages will increase to the estimated level over the life of the plan.

Seafood Processing estimated wages are higher than 1998 State report wages, but are lower than 1996. This is likely reflective of a highly variable industry that is more influenced by global markets and ocean conditions than Forest management activities.

Overall, the estimated average annual wage is somewhat higher than the wages reported by the State, but the regional trend indicates a decline in 1996, with some recovery in 1997 and 1998. This could be due to a combination of poor commercial fish markets, decline in the wood products industry (which is associated with high pay jobs), and an increase in the Retail and Service sectors (which are associated with lower paying jobs).

Evaluation of Results

Stagnant employment growth in the region is a cause for concern. However, while declining, timber employment is at or above predicted levels, and declines in fishing and related employment are the result of external forces beyond the control of the Forest Service. Consequently, the monitoring results are inconclusive at this time. We need to continue monitoring the situation.

Local and Regional Economics Question 2: Has the Forest Service worked with the local communities to identify and pursue Rural Community Assistance opportunities?

Background: The Rural Community Assistance (RCA) Program is a Forest Service program consisting of two parts: the Economic Recovery Program (ERP) and the Rural Development (RD) program. The RCA Program also indirectly includes participation in the Southeast Alaska Community Economic Revitalization Team (SEA-CERT).

Economic Recovery Program: The Forest Service notifies rural communities in or near the national forests of the program, and responds to requests for assistance from communities. The program has grants that are available to (a) organize community action teams, (b) develop community action plans, and (c) implement projects from the community action plan. Grants are competitive, and contingent on annual appropriations.

Rural Development Program: The Forest Service has entered into a cooperative agreement with the State of Alaska to provide this funding through the State's Community Development Block Grant (CDBG) mini-grant program. The program provides seed money for community projects statewide that will produce long-term jobs in the communities.

Southeast Alaska Community Economic Revitalization Team: SEA-CERT is a Federal-State partnership organized to help communities maintain, strengthen or diversify their economies by providing improved access to technical, permitting and financial assistance. The Tongass National Forest Supervisor shares the Federal Co-chair seat with the State Director of USDA Rural Development. The Commissioner of the Alaska Department of Community and Regional Affairs occupies the State co-chair seat. The two Tongass National Forest RCA coordinators provide staff support to the SEA-CERT.

Effects of the RCA program: The community level effects of the RCA program are noted in Table 2-21. The effect of the SEA-CERT program has been to improve communication, coordination, and collaboration between State and Federal agencies on behalf of participating communities. The Forest staff readily works with communities who desire assistance. Some ranger districts have increased collaborative stewardship efforts that often lead to identification and pursuit of RCA opportunities. Monitoring levels are fully adequate.

Table 2-21. Rural Community Assistance Activities and Effects

Community Name	Ranger District	RCA Activity (Yes / No)	Comment (Effect)
1. City of Angoon	ANM	Y	Assistance in community tourism planning. Distributed FY1999 Economic Disaster funds to community.
2. City of Hydaburg	CRD	Y	Assisted Community Action Team re-start to develop Community Action Plan. Distributed FY1999 Economic Disaster funds to community.
3. City of Craig	CRD	Y	Co-funded Klawock Sockeye Conference with Collaborative Stewardship (ERP) grant. Distributed FY1999 Economic Disaster funds to community.
4. City of Klawock	CRD	Y	Scoped boat harbor project received through SEA-CERT. Distributed FY1999 Economic Disaster funds to community.
5. Hollis Community Council	CRD	N	
6. City of Hoonah	HRD	Y	Assisted with the architectural design and engineering study for a city park. Distributed FY1999 Economic Disaster funds to community.
7. City of Pelican	HRD	Y	Organized action team and worked on developing an action plan. Distributed FY1999 Economic Disaster funds to community.
8. City of Tenakee Springs	HRD	Y	Created brochure to promote City; develop retreat and seminar bureau. Distributed FY1999 Economic Disaster funds to community.
9. City and Borough of Juneau	JRD	Y	Distributed FY1999 Economic Disaster funds to community.
10. Borough of Haines	JRD	Y	Assistance in creating a small business resource center. Distributed FY1999 Economic Disaster funds to community.
11. City of Haines	JRD	N	
12. City of Skagway	JRD	Y	Distributed FY1999 Economic Disaster funds to community.
13. Gustavus Community Association	JRD	N	
14. Ketchikan Gateway Borough	KRD/MFRD	Y	Ranger serves on OEDP committee; RD collaborating with Borough and other owners on Gravina Island management planning activities. Distributed FY1999 Economic Disaster funds to community. Transferred Veneer Feasibility Study funding to community. Adjusted Ketchikan Pulp Company contract term to increase the viability of the new veneer plant. In FY 2001, the FS paid $2 million to Ketchikan Public Utilities for right-of-way clearing on the Swan Lake—Tyee Lake Intertie.
15. City of Ketchikan	KRD/MFRD	Y	Ranger District continues to work with the City on 6 power projects.
16. Metlakatla Indian Community	KRD/MFRD	Y	Alaska Fisheries Development Foundation submitted a report / proposal regarding economic development potential on Annette Island. FS staff was in Metlakatla often, coordinating with Mayor and council members on National Forest management projects. Planned Youth Practicum for delivery in Metlakatla. Distributed FY1999 Economic Disaster funds to community.
17. City of Saxman	KRD/MFRD	Y	ERP grant used for audit of permitted business; made final payment; closed grant file; no further activity.
18. Hyder Community Association (HCA)	KRD/MFRD	Y	Coordinated closely with the Community on the re-design and development of the FS bear-viewing facilities and associated transportation facilities. Worked cooperatively with HCA and BC Forest Service to distribute a driving tour guide to nearby points of interest.
19. City of Petersburg	PRD	Y	Continued work on ERP-funded site development for park in low-income housing area. Provided facilitation for community response to SE Transportation Plan. Provided TA to City for recreational boardwalk planning. Assisting

Community Name	Ranger District	RCA Activity (Yes / No)	Comment (Effect)
			with Totem project development. Distributed FY1999 Economic Disaster funds to community.
20. City of Kupreanof	PRD	N	
21. City of Kake	PRD	Y	Preliminary discussions on provision of TA for trail development around Historic Cannery. Extensive cooperation and partnership with Federal agencies on conversion of Forest road to State roads and upgrading community float dock for community access. Distributed FY1999 Economic Disaster funds to community.
22. City and Borough of Sitka	SRD	Y	Assistance in community collaboration and convention marketing. Distributed FY1999 Economic Disaster funds to community.
23. City of Port Alexander	SRD	Y	Completed trail restoration work on Cape Decision Lighthouse with Chief's funding.
24. City of Kasaan	TBRD	Y	Awarded ERP grant for community ambulance. Distributed FY1999 Economic Disaster funds to community.
25. City of Thorne Bay	TBRD	Y	Additional work on Ron's Road / Harbor Road (Spirit Award). Supported facilitator for community meetings on encumbered lands w/ Collaborative Stewardship grant. Continued North Prince of Wales Island Collaborative Stewardship meetings w/ facilitator. Distributed FY1999 Economic Disaster funds to community.
26. City of Coffman Cove	TBRD	Y	Scoped Bulk Fuel Storage and Boat Launch Float projects received through SEA-CERT. Awarded Collaborative Stewardship grant (ERP) for archaeology project in community. Awarded grant (Spirit Award) for fish-cleaning station as part of harbor expansion. Distributed FY1999 Economic Disaster funds to community.
27. Naukati West Homeowners Association, Inc.	TBRD	Y	NWI completed Waterfront Development Master Plan w/ ERP grant; worked w/ community and others on interim boat and float plane facilities and waterfront access.
28. Whale Pass Homeowners' Association	TBRD	Y	Community continued needed road work with ERP grant.
29. Port Protection Community Association	TBRD	Y	Assisted entrepreneur with development plans for an accessible fishing lodge.
30. Point Baker Community Association	TBRD	N	
31. Edna Bay Homeowners' Association	TBRD	N	
32. City of Wrangell	WRD	Y	Previous ERP grants continue to fund Small Business Development seminars. FY99 funds are assisting the development of a downtown revitalization plan and marketing for the new museum and civic center. A collaborative approach was taken in the Wrangell Island Analysis; TA provided for spur road location, Corps permit applications, and Garnet Festival activities. Distributed FY1999 Economic Disaster funds to community.
33. Thoms Place Community Association	WRD	Y	Completion of a community action plan.
34. City and Borough of Yakutat	YRD	Y	Assisted in development of a community cultural center/museum and assist with trustee board development. Distributed FY1999 Economic Disaster funds to community.
35. Southeast Conference	TNF	Y	Previous year ERP funds continue to support development of SE Alaska Overall Economic Development Plan for submission to US Dept. of Commerce, Economic Development Administration in support of proposed designation of SE AK as an Economic Development District.

Minerals and Geology

Goals: Provide for environmentally sound mineral exploration, development, and reclamation in areas open to mineral entry and in areas with valid existing rights that are otherwise closed to mineral entry. Encourage prospecting, exploration, development, mining, and processing of locatable minerals in areas with the highest potential for mineral development. Insure that minerals are developed in an environmentally sensitive manner, and that other high-valued resources are considered when mineral developments occur. Seek withdrawal from mineral entry of specific locations where mineral development may not meet land use designation objectives.

Objective: Implement the Minerals and Geology Forest-wide standards and guidelines.

Background: A wide range of mineral resources and deposit types occur within the boundaries of the Tongass National Forest. Examples of some include, but are not limited to, gold, silver, molybdenum, and uranium, as well as nationally designated “strategic” and “critical” minerals such as lead, zinc, copper, tungsten, and platinum group metals. The Forest Service recognizes that minerals are fundamental to the Nation’s well being and, as policy, encourages the orderly exploration and development of the mineral resources on National Forest System lands. The Secretary of Agriculture has provided regulations (36 CFR 228) to ensure surface resource protection during the exploration and development of the mineral resources.

Minerals and Geology Question: Are the effects of mining activities on surface resources consistent with Forest Plan expectations, as allowed in approved Plans of Operations?

Monitoring Results

Small Mining Operations

An application for one non-bonded, non-energy operation was processed for prospecting activities in Nugget Creek near the Mendenhall Glacier on the Juneau Ranger District. One site visit was accomplished. The operation was found to be in conformance with the notice.

Abandoned Mines

Five abandoned mines on the Juneau Ranger District/Admiralty National Monument were visited in FY 2001, including Pt. Astley, Peterson Lake, Aurora Borealis, Jensen, and Dividend. The purpose of the site visits included mitigation of physical hazards, signing potentially dangerous mine shafts and adits, removal of physical debris and hazardous materials, and bat surveys.

Large Mining Operations

Greens Creek Mine

Greens Creek is located on Admiralty Island. Most of the facilities lie within the Admiralty Island National Monument, however a portion of the operation is located on the Juneau Ranger District. The operation consists of an underground mine that delivers a poly-metallic (silver, zinc, gold, and lead) ore to a surface mill and concentrator, which in turn produces three separate concentrates. These concentrates are shipped to various smelters throughout the world on a regular basis.

Low metal prices have taken their toll on the Greens Creek Mine’s profitability. To make up for the low prices, the mine has increased production, located more silver, and has increased mill throughput. Greens Creek’s planning and permitting departments have kept busy and were able to accomplish the following:

- Received a State Department of Environmental Conservation Solid Waste Permit for waste rock and tails

- Forest Service approval of four revised and amended appendices (Appendix 1-Fresh Water Monitoring Program, Appendix 3-Tailings Impoundment, Appendix 11-production Rock Piles, Appendix 14-Reclamation Plan)
- Mill improvements
- Additional fuel storage facilities
- Installation of a new jet turbine generator
- Addition of a new paste backfill plant

An EIS for expansion of the existing dry tailings disposal facility has been initiated. Scoping has been completed; it is anticipated that a Draft EIS will be available in February 2002 and the final in August 2002.

Revised bond calculations for the Greens Creek mine Reclamation Plan are out for review. The bond calculations draft shows an increase of the bond from 1.8 million dollars to over 20 million dollars.

This year's surface exploration consisted of reconnaissance, detailed geological mapping, ground surveying, surface geochemical sampling, and geophysical sampling. No surface drilling was conducted this year.

Thirty-eight site visits for monitoring Best Management Practices effectiveness and compliance to their Plan of Operations were conducted during FY2001 by our Minerals Management Specialist and by the Project Manager. Our goal for site visits is once a week during the summer and every other week during the winter. Major construction activities may require daily visits.

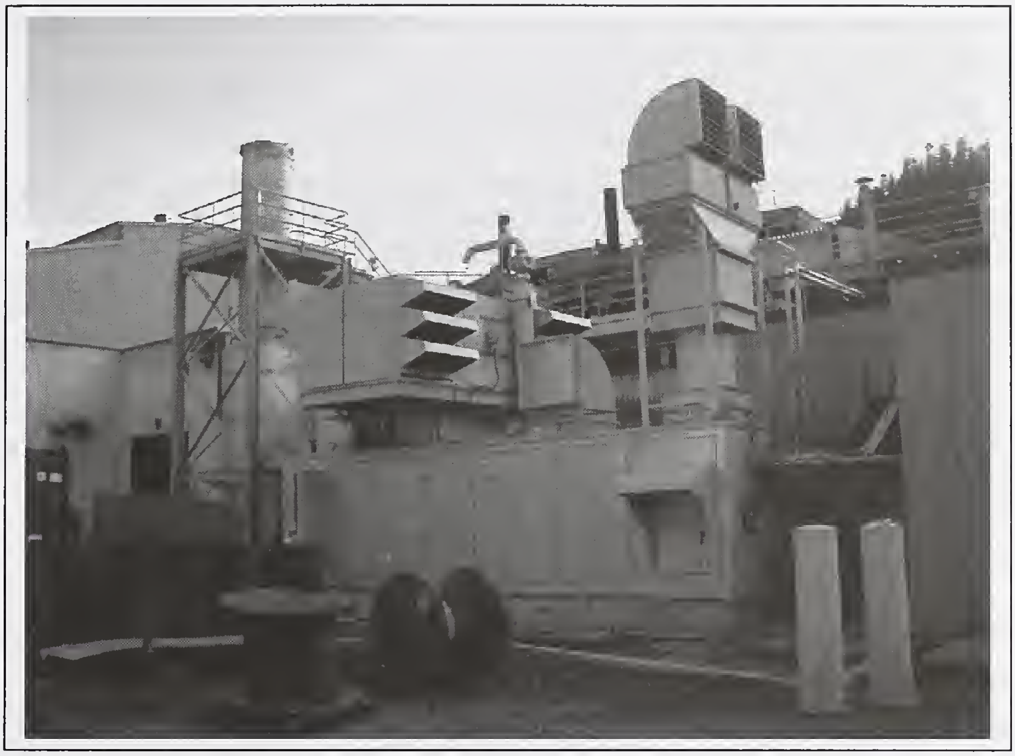
Sampling was completed for the biomonitoring portion of the Freshwater Monitoring Program that was approved this year. Samples were taken from four sites. Laboratory results are not expected until Spring 2002.

Kensington Gold Project

The proponent Coeur Alaska continued to request a delay for issuing the Notice of Intent regarding an amendment to their approved Plan of Operations. This delay will allow them to further investigate ways to optimize the project.

Evaluation of Results

Fiscal Year 2001 inspections of mineral sites indicate that the effects of mining activities on surface resources are consistent with Forest Plan expectations. The necessity of the operator to obtain approval for their Plan of Operations provides the Forest Service the opportunity and authority to control the effects of the development on the Forest surface resources.



Recreation and Tourism

Goal: Provide a range of recreational opportunities consistent with public demand, emphasizing locally popular recreation places and those important to the tourism industry.

Objectives: Manage the Forest's recreation settings in accordance with the Recreation Opportunity Spectrum (ROS) standards and guidelines for each land use designation (LUD).

Background: Southeast Alaska, of which the Tongass National Forest makes up about 80 percent, possesses a remarkable and unique combination of features. These include inland waterways with over 11,000 miles of shoreline, mountains, fiords, glaciers, and large or unusual populations of fish and wildlife that provide a wide range of excellent outdoor recreation experiences. Many of these opportunities cannot be duplicated elsewhere in North America, or most other places around the world. Southeast Alaska imparts a feeling of vastness, wilderness, and solitude. These feelings are enhanced by the small resident population, and relative absence of development compared to most other national forests.

Recreation and Tourism Question 1: Are areas of the Forest being managed in accordance with the prescribed Recreation Opportunity Spectrum (ROS) class in Forest-wide standards and guidelines?

Overall, the districts have reported that areas on the Tongass are being managed in accordance with the prescribed ROS classes as described in the Forest-wide standards and guidelines.

Many sites selected to monitor for 2001 were primarily based on the location of existing recreation facilities and areas of the districts where high use traditionally occurred. Some remote locations were visited during the course of regular patrols of the roads and waterways. Outfitter/guide special use permit records along with written and verbal accounts of guiding activity helped determine high commercial use areas. Observations were also made during the course of completing condition surveys for trails and developed recreation facilities. Additional monitoring was accomplished during the course of other project work, such as during timber sale environmental document preparation.

Not all districts were able to report the monitoring that took place on their districts for Recreation. One district that reported specific areas monitored included:

<u>Wrangell Ranger District:</u> No specific data was collected for Forest Plan monitoring. The results reported are derived from activities that were part of other ongoing recreation programs.

The Wrangell Island hosts continued to monitor use at road-accessed recreation sites on Wrangell Island between May and August 2001. Information was collected on the number of persons, location, activities, and vehicle type for 15 developed sites and trails, and for recreational driving on forest development roads (FDR).

Forest Service hosts' monitoring of recreation use on Wrangell Island, including picnicking and camping, indicates the typical visitor experience is within the social, physical and managerial setting described in the Roaded Modified (RM) ROS class.

The Anan Wildlife Observatory Interpretive Staff continued to monitor visitors during June, July and August 2001. The information collected includes: visitor numbers, demographics, activities, length of stay, and commercial guide use. This monitoring effort indicates the typical visitor experience is within the social, physical and managerial setting described in the Semi-primitive Motorized (SPM) ROS class.

The district recreation staff monitored use and conditions of 22 public recreation cabins and other sites throughout the Wrangell District. Information on cabin use was collected through the National Recreation Reservation System, and it indicates that most recreational use occurs during the spring, summer and fall months. Monitoring use at cabins and other developed recreation sites indicates the typical visitor experience is within the social, physical and managerial setting described in the ROS classes for the areas visited. ROS classes for most recreation cabins are Semi-primitive Motorized (SPM) or Primitive (P).

The Forest Service annually monitors the activities, and amount of use by outfitters and guides on the uplands throughout the district. Use is determined mostly through year-end use reports submitted by permitted outfitters and guides.

Monitoring of reported use by outfitters and guides on the district indicates the typical visitor experience is within the social, physical, and managerial setting described in the ROS classes for the areas visited. ROS classes for these areas range from Primitive (P) to Roaded Modified (RM).

Petersburg Ranger District: The District monitoring data several ways: through project proposals, primarily timber sales, for potential changes in ROS classes; by conducting condition surveys of recreation facilities (cabins and trails) to assess their current condition; through visual surveys of cabins, campsites, and other dispersed sites for indications of ROS class standards; by compilation of campground permits to monitor use; by having the campground host at the Ohmer Creek Campground track visitor use; and by counting number of visitors coming to the Petersburg Visitor Center.

Monitoring Results

Forest wide there was a 7 percent reduction in the number of visits to the 150 public use cabins on the forest. The reductions in use did not occur at all sites, and some cabins received their traditional levels of high use which is attributed to either their locations near communities or their popular resource uses (fishing, hunting, wildlife viewing, etc). Use numbers from the cabins reservation system assist in monitoring the ROS levels for these sites as well as provide indications of trends over time of visitor use for some of the Forest's most popular recreation areas.

Use at the visitor centers varied by site. With the opening of the renovated Mendenhall Visitor Center in Juneau, the facility saw a general increase in use. The Southeast Alaska Discovery Center also noted an increase in use, which they attribute in part to improvements of the Alaska Natural History Associations Bookstore located within the facility. The Discovery Center was also able to enter into cooperative agreements with several small cruise ship lines and with companies with scheduled events near their location to encourage better participation. The forest closed one contact station in Juneau this year that had been located in Centennial Hall primarily due to a reduction in visitations and for funding concerns.

The Hoonah Ranger District continued their collaborative agreements with Southeast Alaska Wilderness Exploration and Discovery (SEAWEAD) to monitor three sites for land and offshore activities.

Proposed timber sales that were analyzed for ROS changes this year on the Petersburg Ranger District included: Woodpecker, Threemile, Fanshaw, Douglas, and Overlook. The anticipated changes from Primitive or Semi-primitive to Roaded ROS settings are compatible with the Land Use Designations where they occur. During 2001, harvest occurred on Kupreanof and Mitkof Islands. Most areas where harvest occurred had Roaded Modified settings so the ROS class did not change. On Kupreanof, some of the timber harvest changed a few acres of Semi-primitive settings to Roaded Modified settings. These changes were compatible with the Land Use Designations where they occurred and were anticipated in NEPA documents.

Condition surveys on the Petersburg Ranger District of 20 percent recreation facilities and 20 percent trails did not reflect any visitor impact conflicts with ROS class. Use at the Ohmer Creek Campground did not exceed 80 percent of the design capacity. The number of camping permits issued was 289; which is 14 percent down from 2000. Cabin use numbers for FY01 on PRD was 310 reservations net total. The use levels at individual cabins meet standards and guidelines for ROS. The Petersburg Visitor Center had 4,383 visits during the high use season of May through September. This is up about 3 percent from the summer of 2000. Visual surveys of dispersed recreation places indicates almost all places meet the standards and guidelines for number of encounters. The use at the mouth of Petersburg Creek on the Petersburg Lake Trail may have exceeded the Semi-Primitive Motorized encounter guideline of 6 parties on several occasions. This was a qualitative observation since there was not any standardized sampling done to monitor this site. A complication at this site is that it also receives a substantial amount of use from boats on short daytrips from Petersburg and many of the people don't get out on shore.

Evaluation of Results

Districts accommodated monitoring work as a normal course of business. While results are not readily available for this report, information related to the management of the Forest Standards and Guidelines will be incorporated into several decision that will be forthcoming this from the agency in 2002. First will be the completion of the Shoreline Outfitter/Guide Environmental Impact Statement that will refine management directions for almost 5,000 miles of shoreline along the coast of islands for four ranger districts. Next, the Petersburg and Wrangell Ranger Districts will review the allocations provided to outfitters and guides in a prior environmental assessment (EA) in 2002. The Forest Supervisor will either amend the levels of use for outfitters and guides on the Petersburg and Wrangell districts or agree that the level of use is consistent with the outcomes as anticipated in the EA and reissue the decision.

The Petersburg Ranger District reported that all of the standard monitoring programs should be continued (cabins, trails, developed sites, dispersed campsites, timber sales, winter use and the visitor center). Several specific sites were indicated in last year's report as needing follow-up monitoring; including the Woodpecker campsite and the mouth of Petersburg Creek. Neither received monitoring in 2001 due to low funding levels and personnel shortages.

There were no other specific evaluations of recreation monitoring data performed, as funding and staffing were not available.

Recreation and Tourism Question 2: Is Off Road Vehicle (ORV) use causing, or will it cause considerable adverse effects on soil, water, vegetation, fish and wildlife, visitors or cultural and historic resources of the Forest?

The primary ORV use on the Tongass has been snowmobiles and four-wheelers. Snowmobiles generally make use of Forest roads and higher alpine areas during the winter months, although some use does also occur within the Stikine-LeConte Wilderness and in Yakutat. Use of this equipment during winter months is restricted to times when there is adequate snow cover as provided by the Alaska National Interest Lands Conservation Act (ANILCA). Four-wheelers are normally used for hunting during the fall months on Forest roads.

On the Petersburg Ranger District, four-wheelers are used predominantly during moose and deer hunting season (although the campground and picnic area receive some inappropriate use). A qualitative visual survey of use was kept for vehicle parking areas for winter use, in particular at the Twin Creek and Blind Slough area.

The Yakutat Ranger District with the cooperation of the Alaska Department of Fish and Game, Habitat Division evaluated impacts from ATVs use on the Yakutat Forelands during the 2001 field season. The data was used to develop a GIS based model for predicting suitable ATV trail routes. These routes are to be evaluated in the ORV management plan the District is currently working on. ATV use on the Yakutat Forelands has been steadily increasing over the last fifteen years. Users are establishing trails primarily to reach favorable hunting and fishing areas. These “pioneer” trails generally follow the easiest routes along stream courses or across wetland meadows.

Monitoring Results

ORV use on the Tongass in general is not causing considerable or adverse effects on soil, water, vegetation, fish and wildlife, visitors or cultural and historic resources on the Forest. The Craig Ranger District reported some minor damage to wetlands and soils occurring at the Twenty-Mile Spur and the Maybeso Experimental Forest area on the district. The Wrangell Ranger District has also documented some minor disturbances that have been scattered throughout the district in several locations on Wrangell Island and Zarembo Island. Yakutat has been working to evaluate the impacts of the Yakutat forelands and reported numerous trails that show signs of soil, wetland and stream degradation.

Improperly developed ATV trails through wetlands divert surface and ground water flow and act as drainage ditches, this reduces water residency times altering wetland function. Long-term affects of this drainage may result in altered plant communities, degraded fish and wildlife habitat, and may result in the disappearance of the wetlands. Many areas in the Yakutat forelands with numerous trails are already

exhibiting signs of watershed degradation: intercepted stream courses, stream bank and water quality degradation and drainage of wetlands.

The Yakutat assessment focuses on providing essential baseline information to quantify the risk to fish habitat and wetland degradation from ATV use. The survey examined five variables associated with trail degradation and the relationship with soil types, and found only one to be significant. The depth of rutting due to ATV use is significantly correlated to the SMU (Soil Map Units) type, providing us with a predictive surrogate for Off Highway Vehicle OHV management planning purposes.

The Survey Crew mapped approximately 85 mi of ATV trails in the Yakutat Forelands and recorded 156 data points of variables associated with ATV trails. Mapping occurred at regular intervals of 200 meters for the data points and the entire trail lengths were GPS mapped. The variables measured at each data point were: vegetation type, rut depth, stream crossing, water depth, evidence of flow, and trail width.

On the Yakutat assessment, they developed a model to evaluate their data. Based on the findings, we modeled the SMUs available in our GIS system to determine areas of suitable trail locations. Along with trail inventory work, we sampled for anadromous fish at stream crossings. As a result, 207 miles of previously unidentified anadromous fish habitat was nominated for inclusion in the ADF&G Anadromous Waters Catalog.

The Petersburg Ranger District noted that snowmobile use generally has met the standards and guidelines with the exception of inappropriate use during low snow levels in the Twin Creeks area. Also, some four-wheeler damage near the Ohmer Creek campground is being pursued by law enforcement.

OHV impacts have not been specifically tracked over the past year on the Ketchikan-Misty Ranger District. However, it is believed that due to minimal snowfall this year, use had stabilized if not dropped. Snow machines/mobiles use occurs in the area around the Ward Lake Recreation Area, Brown Mountain and near Hyder, Alaska. The extent of the damage of these resources is unknown.

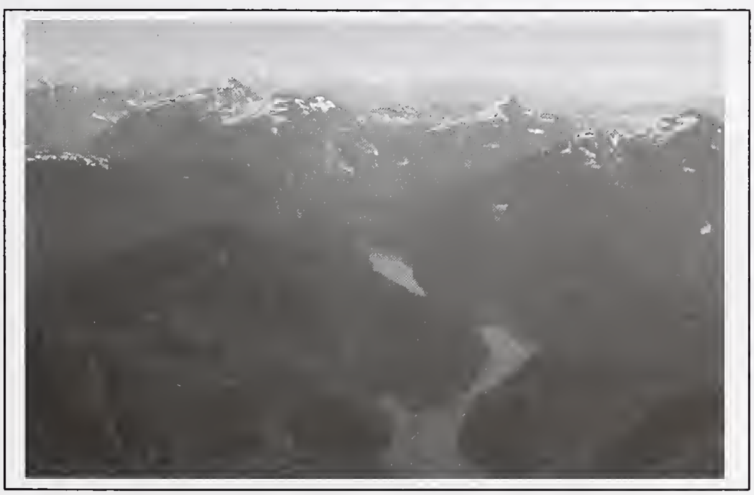
Evaluation of Results

The Petersburg Ranger District has recommended more monitoring of winter recreation use this year with an emphasis of a presence in the Twin Creek area and on aerial photography to document intensity and use areas. The district also recommends more monitoring and interactions with persons using four-wheelers for hunting to help mitigate additional impacts.

In Ketchikan, All Terrain Vehicles (ATV) use showed a greater impact to the resources than on some districts. These impacts have occurred in muskegs outside of Harriet Hunt and along the Brown Mountain Road. There exists a need to complete a travel management plan for the Ketchikan-Misty Fiords Ranger District and identify more clearly for the public the areas open for OHV use.

The Yakutat Ranger District is working complete evaluation of their monitoring results. This evaluation should be complete in FY 02.

There were no other specific evaluations of recreation monitoring data performed, as funding and staffing were not available.



Research

Goal: Continue to seek out and promote research opportunities that are consistent with identified information needs.

Objective: Cooperate with PNW in pursuing the high priority information needs identified in Appendix B [of the Forest Plan] through the intra-agency agreement entitled "Joint Studies for Improved Future Tongass National Forest Planning" and other means.

Background: Appendix B of the Forest Plan identifies priority research important for further Forest Plan amendment or revision, and lists additional data and information needs that will help to implement the Forest Plan. While not essential to the completion of the Forest Plan, results of the priority research items, prior to the completion of the next revision of the Forest Plan, will substantially strengthen the scientific information base needed to support alternative development. An important element of the priority research items and additional information needs is an "adaptive management" feedback loop to evaluate current plan direction, design monitoring programs to measure effects, and adjust future management activities to better address economic, social, and environmental concerns on the Tongass.

As a part of this process, statistically sound sampling design and analysis techniques need to be developed to assure reliability of monitored data and interpretations. This additional research component will be important for maintaining the scientific creditability of the Forest Plan.

Research Question: Have identified high-priority information needs been fulfilled?

Monitoring Results

The following is a summary of the progress and significant results from research studies addressing high priority information needs and other information needs. Listed for each applicable priority need is the research need stated in the Forest Plan, Appendix B, followed by a statement that briefly describes the focus of the research.

<u>Project 1: Alternatives to Clearcutting (ATC)- Experimental Study</u>

Objectives: Evaluate a wide range of silvicultural options for managing old-growth forests in Southeast Alaska in order to determine their biological, physical, and socioeconomic effects, and to clarify the operational issues related to ATC treatments.

Accomplishments: Major efforts were made during 2000 and 2001 to upgrade the permanent monuments marking the plot systems at Hanus Bay and Portage Bay, in preparation for the five-year vegetation assessments planned for 2002 (Hanus) and 2004 (Portage). Vegetation data were collected with a system of permanent sample plots. We obtained detailed measurements on roughly 13,200 living and 3,500 dead trees in 27 stands. These measures include species, age, size, form, growth, micro site, and presence of damaging agents. Understory vascular plant cover and biomass were measured on these plots to characterize plant abundance, diversity, and deer forage availability.

To characterize the pre- and post-harvest composition and density of forest birds, we conducted censuses during the nesting season. We conducted the censuses at three stations within each experimental unit at three times between early May and mid-July. In FY 2001 the study was conducted at the Portage ATC site.

We examined invertebrate (terrestrial and aquatic) and coarse detritus transport from forested headwaters to downstream aquatic habitats. Fifty-two small streams representing a geographic range throughout Southeast Alaska (three ATC units – Hanus Bay, Portage Bay, and Lancaster Cove, and one additional site near Juneau) were sampled with 250-μm nets per 24-h intervals either seasonally (spring-summer-fall) or biweekly throughout the year. Sampling occurred in fishless reaches, and in most cases upstream of salmonid-bearing habitats, to assess the potential energy subsidies fishless headwater streams make to downstream salmonid habitats. Streams at the Portage Bay ATC site were sampled in FY 2001.

An automated system of sensors and dataloggers was established to continuously record rainfall and groundwater accumulation and movement. These data will be used to determine the groundwater response to seasonal and individual-storm rainfall, both before and after treatment. Multiple years of pretreatment data were collected, allowing us to characterize baseline levels of year-to-year and seasonal variability.

Benefits to NFS: This study provides a greater number of scientifically tested options for joint production of wood and other forest values. Information on the costs and benefits of adopting alternative silvicultural systems, allowing better informed choices among management alternatives, is supplied through the study findings. Alternative systems may lead to reduced conflict and greater social acceptance of commodity production, by yielding sustainable timber harvests, protecting fish and wildlife habitat, maintaining biological diversity, maintaining slope stability, and reducing visual impacts. This study provides guidance for implementing Forest Plan direction to increase the use of alternatives to clearcutting.

Project 2: Alternative to Clearcutting (ATC) – Retrospective Study

By examining a variety of partial cut stands, some as old as 90 years, through an interdisciplinary study, it is possible to determine the success of regeneration in comparison to old-growth stands.

Objectives: Forest composition, vigor and spruce regeneration were a focus of study. Through an intensive examination by an interdisciplinary team, the growth response of residual trees, understory abundance and diversity, conifer regeneration dynamics, harvest-related damage to the residuals, and subsequent damage from wind, mistletoe, or fungal decay in wounds were examined in a variety of partial cut stands.

Accomplishments: Over 270 partial cut stands throughout Southeast Alaska were identified from 1995 to 1997. Of these, intensive studies were conducted on 18 stands harvested with ground-based logging systems and 12 stands harvested with helicopters. Tree increment cores and stem sections, along with comprehensive overstory and understory vegetation data, were used to ascertain stand histories and to describe their response to partial cutting. This work focused primarily on forest vegetation with some work on forest birds. The study showed that Sitka spruce can be maintained in mixed western hemlock-Sitka spruce stands over a wide range of cutting intensities. It also showed that partial cutting maintained stand structures similar to uncut old-growth stands, and that cutting did not have significant effects on tree species composition. Concerns about changing tree species composition, lack of spruce regeneration, and greatly reduced stand growth and vigor with partial cuts were largely unsubstantiated. The species richness and community structure of understory plants were similar among uncut and partial cut plots. Several journal articles have been submitted or are in preparation as a result of this study.

Benefit to NFS: This study provides a greater understanding of the physical dynamics of partial cutting on old-growth stands. The finding that partial cutting does not result in large timber losses due to windthrow, dwarf mistletoe, or bole wounding responds to concerns that forest managers have had in regard to partial cutting in old-growth forests. This provides confident alternatives for harvest methods on the forest.

Project 3: Alternatives to Clearcutting (ATC) --Social Acceptability of Alternative Forest Management Practices

The larger interdisciplinary study aims to evaluate the ecological, economic, operational, and social aspects of an array of timber harvesting techniques as alternatives to clearcutting old-growth forest stands in Southeast Alaska. This long-term project comprises the social acceptability component of the larger study.

Objectives: FY 2001 objectives included completing exploratory field interviews concerning the social acceptability of alternatives to clearcutting, undertaking a literature review on this topic, and developing a survey approach to measure public attitudes, values, and experience related to a range of forest management practices.

Accomplishments: In FY 2001, we completed a literature review of relevant publications concerned with social acceptability and a publication of findings from a MA level study. Work proceeded on two survey

efforts to assess the social acceptability of different forest management regimes. We coordinated our work with the State of Alaska's Visitors' Statistics Program study to incorporate questions concerning forest management into their study. Approximately 5,000 randomly sampled visitors to Alaska were asked sets of attitude and value questions. Data will be available in 2002.

In previous field research, we conducted interviews with 27 well-informed respondents representing nine interest groups in Southeast Alaska. Respondents agreed with the likely effects of different treatment regimes. Differences in social acceptability were based on how respondents used forest resources, how respondents valued forest outputs and, more deeply, on their worldview. Interestingly, visual quality did not appear to be a predominant determinant of social acceptability for these respondents. The second survey, Southeast Alaska Public Survey, requires the Office of Management and Budget approval. When administered, this survey will contact a large stratified sample of Southeast Alaska residents by telephone, asking questions concerning forest management and social acceptability as components of a larger survey. OMB approval was secured in August 2001 (Further analysis in Project 11).

Benefits to NFS: Much information concerning public attitudes and values related to timber management practices was gathered during the revision of the Forest Plan. This project will further our understanding of public preferences for and responses to future forest management practices. Findings from this project will assist in developing management plans that may achieve higher public acceptance.

Project 4: Density and Demography of Endemic Small Mammals

Objectives: The purpose of the effort is to determine habitat relationships and estimate density of two endemic small mammals: the Prince of Wales flying squirrel and the Wrangell Island red-backed vole among forest habitats of the Tongass National Forest. Specific objectives include documenting the following among commercial forest land habitats for the flying squirrel: 1) density of POW flying squirrels in productive old-growth and mixed-conifer habitats; 2) age and sex composition of study grid samples; 3) number of reproductive females; and 4) microhabitat features associated with capture of individuals' age and sex groups. Similar objectives were considered among these commercial forest land habitats for the red-backed vole: 1) density of voles in productive old-growth, mixed-conifer/muskeg habitats, and pre-commercially thinned young growth. In addition to the original study, similar data was collected on the Keens mouse population on Wrangell Island as well.

Accomplishments: Fieldwork has been completed as proposed in the study plan. Information included in the FY 2001 completed reports includes: (1) the abundance of Wrangell Island red-backed vole and Keens mouse, and Prince of Wales flying squirrel, (2) age and sex distribution of grid samples for each species, and (3) body condition and reproductive performance of each species. Additional work will include the microhabitat features associated with capture of individuals, and development of a habitat model.

Benefits to NFS: This project meets strong commitments in the Forest Plan Record of Decision and Forest Plan to generally increase study efforts on endemic small mammals. It also provides baseline ecological information regarding habitat distribution and abundance among four important forest habitats for three reputed old-growth habitat species that are endemic to Southeast Alaska and consequently have limited geographic ranges. This information will contribute toward a habitat model that should aid in determining habitat needs and the potential effects of timber harvesting in preferred habitat.

Project 5: Salmon Habitat Monitoring

Objectives: To develop effectiveness monitoring protocols for aquatic habitat conditions.

Accomplishments: The emphasis of the past four years of work has been on collecting and analyzing data sampled from major geographic areas of Southeast Alaska. Single channel floodplain reaches were selected as the focus of the study to increase the probability of detecting differences (larger effect size), to increase the statistical power of the sample size, and to sample low-gradient depositional channels, where cumulative watershed effects are most likely to be measurable. Preliminary data analysis has been completed to determine the adequacy of the sample plan, test and verify sample methodologies, and to further develop hypotheses. In 2001, emphasis shifted to data analysis and interpretation. A

reduced data collection program was maintained, involving resampling of eight pre-existing sites. In 2002 data analysis will be competed and draft results will be made available.

Benefits to NFS: The identification and measurement of interactions between aquatic/riparian habitat and disturbances in upland areas, and the response of anadromous and resident salmonids, will provide information necessary to properly design major ground-disturbing activities in upland areas to minimize impacts on salmonid habitats.

Project 6: Recreation and Tourism

Recreation and tourism present a number of challenges to management of the Tongass National Forest. In contrast to timber, recreation/tourism outputs are difficult to measure, they usually have no explicit dollar value, and their "production functions" are not easily defined. Similarly, the influence of management decisions on the quantity and quality of outputs, as well as the impacts of recreation/tourism development in general on local welfare are still not well understood. With the increasing importance of recreation/tourism in Southeast Alaska, the need to better understand this resource and its relation to management has become increasingly obvious. This study program is designed to meet this need.

Objectives: The central objective of this study program is to define and explore central questions and topic areas for future research. Efforts are underway to develop tourism/recreation planning and research goals for the Alaska Region. Initial research directions include: (1) demand for forest-based recreation/tourism; (2) role of recreation/tourism in local economic development; and (3) allocation and pricing of recreation/tourism opportunities. This problem definition should be seen as an ongoing process in which research products and "answers" will be used to identify future research questions and directions.

Accomplishments: Two studies are now in progress: 1) Macroeconomic analysis of structure and trends in recreation and tourism in Southeast Alaska. A final draft of the tourism trends paper is now through review and should be available in the near future. Preliminary analysis of the data show that the cruise ship tourism industry tends to be the dominant tourism/recreation engine in the region. An apparent trend of growth is estimated around 7 to 10 percent annually; other tourism sectors show no or much slower growth.

2) Using markets and economic instruments as management tools for recreation and tourism in Southeast Alaska. Research during FY 2001 included completion of fieldwork in Hoonah and Craig/Klawock using the same field methods as applied in Haines the previous year. Draft community reports for Haines and Hoonah are completed based on this research. Community reports included preliminary findings based on interviews conducted and review of secondary material. Findings identified differences both in the type and level of tourism in these communities and in the community's response to tourism. Aspects of this work were presented at a regional tourism symposium held in Juneau in the spring of 2001. Other progress involves gathering information on Forest Service recreation programs from Tongass National Forest staff, and developing familiarity with issues and tools related to user fees and other recreation pricing techniques.

Benefits to NFS: The benefits to the Forest Service in Region 10 include a better understanding of the central issues involved in recreation/tourism management of the Tongass National Forest. Work in this area also will serve to summarize for managers the experience of professionals working in recreation/ tourism in other regions and countries. Hopefully, it will identify specific policy improvements enhancing public benefits or Forest Service revenues.

Project 7: Timber Supply and Markets

This project focuses upon the economics of timber production and wood products processing in Southeast Alaska. Main topics include: (1) production costs and the Region's relative advantage in different types of wood products production; (2) the relative position of Southeast Alaskan species and log grades in foreign markets; and (3) demand projections for the Region's wood products.

Objectives: The project's objective is to develop economic and market information to better inform Forest Service policy makers. Specific examples include demand projections in relation to the TTRA and the Forest Plan, identification of fiscal impacts of policies such as the cedar log export ban, assessment of

the viability of different types of timber processing activities, and identification of the relative efficiencies of different policies to promote value-added manufacturing in the Region.

Accomplishments: In FY 2001, most of the work was devoted to completing projects begun in prior years. Two publications were released. One is entitled "Assessment of the Competitive Position of the Forest Product Sector in Southeast Alaska, 1985-94" PNW GTR 504, by Robertson. This document provides an analysis of the production costs and related issues for timber products in Southeast Alaska as compared to British Columbia and the Pacific Northwest. The second publication, "Alaska Softwood Market Price Arbitrage" PNW GTR xxx (in press) by Stevens and Brooks, formally tests the hypothesis that markets for Alaska lumber and logs are integrated with markets for similar products from the Pacific Northwest and British Columbia.

Benefits to NFS: The benefits to the Forest Service in Region 10 from this competitive advantage study include a detailed analysis of production costs in the Region and the assessment of the profitability of different products, species and log grades. This information, in turn, will be an essential element in identifying efficient and inefficient policies designed to achieve Forest Service policy goals in the area of timber management, particularly efforts to promote value-added processing in the Region. The market arbitrage study quantified the linkages between prices in Southeast Alaska and those of the Pacific Northwest. This information, in turn, can be used to link Region 10 market and planning projections with broader national projections such as those found in the RPA.

Project 8: Tourism/ Recreation Economic Studies

This long-term project initiates study of tourism and recreation topics in the Tongass National Forest. Research is planned to examine aspects of the increasing tourism and recreational use of the forest, residents' attitudes and values concerning tourism development, tourism and recreation demands on forest resources, tourism and recreation growth vectors, and the interaction of tourism and recreation with other forest uses. Initial research will focus on Southeast Alaska residents and communities. Subsequent years' research will examine visitors' experience with the Tongass National Forest and the national perspective on the use of this forest for recreation and tourism.

Objectives: Specific objectives for work in FY 2001 were the consideration of the economic contributions and issues associated with recreation and tourism in Southeast Alaska.

Accomplishments: Work in this area examines recreation and tourism as an economic sector, and the impacts of tourism and recreation on local economies. This includes the analysis of visitor patterns and expenditures, job creation, structural shifts in economic composition, and community dependence on tourism. Other objectives include developing a description of the structure of the recreation/tourism sector; analysis of factors affecting both trends and structural change in the sector; and approaches to identifying the role of the National Forest in this sector.

One report was published as a PNW General Technical Review and another report will be included as part of a joint publication. FY 2001 saw the preparation of survey instrument components covering tourism issues to be part of a resident survey in Southeast Alaska (see Project 11 below). This survey will be administered as soon as funding can be secured to complete this task. Researchers have been active in interagency steering committee meetings in drafting and conducting surveys of (1) Southeast Alaskan outfitter-guides, (2) visitors to Southeast Alaska, and (3) Alaska resident in-state travel patterns and recreation use of public lands. One researcher has focused on identifying economic research questions related to the cruise ship industry and its relationship to and implication for Southeast Alaska regional and community dynamics and public lands management.

Community based tourism studies in three Southeast Alaska communities (Haines, Hoonah, and Craig/Klawock) began during FY 2001 (see Project 6). The research focused on each community's response to tourist activities and the changing use and definition of natural resources that result from these activities. Interviews with community members, and with tourism business operators were the basis of the field studies. Fieldwork has been completed in Hoonah and Craig/Klawock. A field report based on work in these communities will be forthcoming.

Two publications have been produced as a result of this study. One is entitled : "Tourism and natural resource management: a general overview of research and issues" by Jeffrey Kline PNW GTR 506. This study describes concepts of and provides a review of literature relevant to ecotourism and natural resource management. The second publication, "Tourism growth in Southeast Alaska: trends, projections and issues" PNW GTR xxx by Schroeder, Cerveny and Robertson, discusses an economic based model to estimate the tourism component of Southeast Alaska's regional economy at the borough level.

Benefits to NFS: Tourism and recreation have been growing rapidly in the Tongass National Forest, with attendant greater and varying demand on forest resources, as the region changes from commodity production to a different economic base. Residents' and communities' interest in and response to these tourism and recreation increases are complex. This research will provide needed objective information on tourism and recreation not available from other sources.

Project 8A: Markets as Economic Instruments for Recreation/Tourism

This project focuses on the broad-scale knowledge of the economic sector of recreation and tourism. Little is known of the general value of recreation and tourism services provided at the National Forest level or the value of specific services provided to individual entrepreneurs.

Objectives: To gain an understanding of the opportunities to use markets and economic instruments such as auctions, tradable permits, graduated fees, etc. to manage the type, level or location of recreation and tourism use.

Accomplishments: Work was to begin in calendar year 2001 with the results from the outfitter/guide survey and a comprehensive literature review used to develop a study plan. As a result of employee movement this study was deferred. In March 2001 the PNW Social and Economic Values researchers and the Alaska Regional Office hosted the *Forum on Recreation and Tourism Research in Alaska* symposium. This symposium was to provide an arena where professionals in the field of recreation and tourism could exchange ideas, data, research results and information needs. Another objective was to facilitate communication among researchers and between researchers and interested audiences.

Benefit to NFS: Benefits to the Forest Service in the Alaska Region (Region 10) include a better understanding of the central issues involved in recreation/tourism management of the Tongass National Forest. Further knowledge of the general value of recreational opportunities on the National Forest can help in understanding how to manage for different types and levels of recreation and tourism use.

Project 9: Subsistence Data Gathering and Analysis

Subsistence harvest of fish and wildlife continues to be a key activity in most of the Tongass National Forest. The Alaska National Interest Land Conservation Act (ANILCA) requires the Forest Service to evaluate the impact of its land use actions on subsistence. Additionally, the Federal Subsistence Board has management authority over subsistence hunting and fishing on the Tongass National Forest, and the Forest Service has the main responsibility to collect data needed for management decisions. This long-term project provides for systematic collection and analysis of subsistence data for Tongass National Forest communities.

Objectives: To better understand subsistence harvest and use of fish and wildlife by residents of Southeast Alaska communities, and to examine diachronic changes and trends in subsistence.

Accomplishments: Harvest assessments were completed for Petersburg, Saxman, Wrangell, and Yakutat. The Yakutat Native Association completed harvest assessment for Yakutat in early 2001. These field studies completed the multi-year harvest assessment project. The small communities of Elfin Cove, Gustavus, Hyder, Meyers Chuck, Pelican, Port Alexander, and Tenakee Springs have not been covered in this research effort. Household surveys have been conducted in 24 Southeast Alaska communities.

Harvest assessment data have been included in a statewide Community Profile Database maintained by the Department of Fish and Game. These data are Internet accessible. This marked the completion of a five-year study to update community level subsistence data in Southeast Alaska. Data will be reported in FY 2002 and analysis will examine the change in continuity in subsistence patterns in Southeast Alaska communities at both a community and a regional scale.

Benefits to NFS: This project provides data and analysis needed both for forest management objectives and for meeting Federal subsistence management requirements.

Project 10: Traditional Ecological Knowledge

This project is exploring Tlingit Indian traditional ecological knowledge of the forest and its resources, with an interest in identifying possible relationships between traditional ecological knowledge and scientific understanding of the forest and of forest processes.

Objectives: To review existing literature related to Tlingit Indian knowledge of forest resources and to corroborate or correct the existing literature by conducting interviews with Tlingit elders and standard bearers on the themes identified in this literature. To work with the tribes by providing technical assistance, project management, and tracking to insure consistency in the project throughout the project area. To outline directions with the tribe for further productive research on traditional ecological knowledge topics, bearing in mind that these are tribal projects, not National Forest projects.

Accomplishments: The project is to establish TEK studies in three Southeast Alaska Native communities per year, with work in each community to take place over a two-year period. In FY 2001, we began work with tribal governments in Angoon, Kake and Hoonah to develop TEK studies in each of these communities. Work with Hoonah and Kake is well underway, while Angoon is progressing slower due to changes in the tribal government in the community. Late in FY 2001 this project was initiated in Craig, Sitka and Yakutat, the next set of communities to be covered. Contemporary Tlingit and Haida communities are generally located within historic tribal territories, and tribe, clan, and house use of land and natural resources continues to have contemporary importance. Clan and tribal territories continue to be central features of Native worldview and to influence current Native land use. Findings are showing that less use has been made of some traditional territories due to access restrictions, changes in resource use, and maintenance of fewer subsistence hunting, fishing and gathering camps.

Benefits to NFS: This project provides an approach to understanding the potential use of forest products and other natural resources, and possible limitations of traditional ecological knowledge.

Project 11: Social Characteristics of Southeast Alaska Communities, Impact of Forest Management, Southeast Alaska Residents Attitudes and Values.

This project examines aspects of the interaction of Southeast Alaska communities with the Tongass National Forest.

Objectives: To develop a research approach to examine community-forest interactions.

Accomplishments: This is referred to in Project 3: -- Social Acceptability of Alternative Forest Management Practices. Most effort in this project has gone into development of the Southeast Alaska resident survey. In late FY 1999, work began with the University of Alaska, Anchorage, Institute for Social and Economic Research (ISER) to develop an appropriate survey instrument and methodology. Funding has since lapsed through UAA. The Office of Management and Budget did approve this survey in August 2001; however, funding to implement was not available in FY 2001. The Southeast Alaska Public Survey is intended to provide quantitative measures of Southeast Alaskan resident responses concerning: (1) uses of forest resources, (2) forest management, (3) tourism and recreation, (4) quality of life, (5) agency evaluation, (6) knowledge of forest planning, (7) subsistence, (8) future vision of the Tongass, and (9) social and economic studies.

Benefits to NFS: This study will lead to a better understanding of how Southeast Alaska residents interact with the forest and encourage development of management approaches more closely aligned with local need.

Evaluation of Results

Progress on each of the Research studies is progressing as anticipated. None of the preliminary results from the studies have identified any need to change the Forest Plan at this time.

Scenery Resource

Goal: Provide Forest visitors with visually appealing scenery with emphasis on areas seen along the Alaska Marine highway, popular small boat routes and use areas, State highways, major Forest roads, major recreation facilities and from popular recreation places. Recognize that in other areas where landscapes are altered by management activities, the activity may visually dominate the characteristic landscape.

Objectives: Manage the scenery of the Forest in order to achieve the following visual quality objectives:

- Retention – 4.8 million acres plus acres of Retention in Wilderness;
- Partial Retention – 3.2 million acres;
- Modification – 0.4 million acres;
- Maximum Modification – 2.8 million acres.

Background: Each land use designation (LUD) in the Forest Plan has a corresponding visual quality objective that defines maximum levels of visual impact desirable from human-induced alterations to the natural landscape character. Associated with each objective is a set of recommended guidelines that includes unit size ranges and type of harvest treatment for different visual absorption capability settings. Also part of the FORPLAN modeling process includes a set of guidelines that define roughly how much of a viewshed (or logical part of a viewshed segment) can be in a "disturbed" condition and still meet the visual quality objective. This monitoring effort is intended to assess whether these guidelines, as applied, actually result in meeting established visual objectives.

Definitions:

Harvest treatment – clearcut, group selection, single-tree selection, diameter-limit partial cut.

Visual Absorption Capability (VAC) – the ability of a landscape to absorb human-caused alterations without changing the natural character of the landscape. There are three classifications – Low, Intermediate, and High. Low VAC landscapes are generally those with steep slopes, minimal terrain and vegetative diversity. High VAC landscapes are those with gentle slopes, and/or high terrain and vegetative diversity.

Scenery Resource Question: Are the standards and guidelines effective in attaining the adopted Visual Quality Objectives established in the Plan?

The Forest Plan monitoring and evaluation criteria for determining the effectiveness of the Scenery standards and guidelines are whether the standards and guidelines associated with the harvest unit size, type of silvicultural system used, amount of dispersal between units, and the overall percent of viewshed disturbed are generally adequate to meet the different visual quality objectives in different types of landscapes.

The Forest Plan directs that a representative set of viewsheds across the Forest that have been harvested during implementation of Forest Plan standards and guidelines be selected for evaluation and monitoring. The viewsheds selected should be associated with the use areas or travel routes on the Visual Priority list identified in the Forest Plan. The viewsheds should include areas representing the different characteristic landscapes and different Visual Absorption Capability settings. Monitoring should also include assessing the effectiveness of alternatives to clearcutting management. Monitoring and evaluation reporting should occur three to five years following adoption of the Forest Plan and at approximately five-year intervals thereafter.

In 1999 extensive monitoring was undertaken on the Tongass to assess the adequacy of the scenery standards and guidelines in the Forest Plan. Four viewsheds were analyzed across the Tongass. The results were documented in the 1999 Forest Plan monitoring report.

In 2000, because of very limited funding, staffing and other priorities, no formal effectiveness monitoring of Forest development activities based on Forest Plan scenery monitoring protocols took place similar to that which was done in 1999.

Since the adoption of the Forest Plan in 1997 very little harvest of planned timber sales has occurred which used the Plan's scenery standards and guidelines. Some small timber sales have been recently implemented which were planned using the current Forest Plan's standards and guidelines. These harvested areas will be the focus of future monitoring activities to determine if the results of this harvest can adequately address the Forest Plan monitoring question. Funding for monitoring activities, however, appears to be limited at this time. Therefore, the amount of formal monitoring conducted in these possible areas will depend upon the level of funding allocated.

No monitoring was conducted for the scenery resource in FY 2001. Scenery monitoring is planned for FY 2002.

Soil and Water

Goals: Maintain soil productivity and minimize soil erosion from land-disturbing activities. Minimize sediment transported to streams from land-disturbing activities. Maintain and restore the biological, physical, and chemical integrity of Tongass National Forest waters.

Objectives: Attain Alaska Region (R-10) Soil Quality Standards. Attain State of Alaska Water Quality Standards.

Background: Implementation of Soil and Water standards and guidelines is necessary to maintain soil productivity and water quality. The Soil and Water standards and guidelines are implemented as Best Management Practices (BMPs) described in FSH 2509.22. Region 10 Soil Quality standards are documented in FSM 2554. Methods for effectiveness monitoring of Soil Quality standards are also referenced in FSM 2554. Soil conservation practices are practices used to ensure that ground-disturbing activities will meet the R-10 Soil Quality standards. Typical soil conservation practices include log suspension requirements in timber harvest units and the use of full-bench and end-haul road construction techniques on landslide-prone terrain. Implementation monitoring evaluates whether or not soil conservation practices were required and implemented. Effectiveness monitoring determines whether or not the soil conservation practice used kept the ground-disturbing activity within the R-10 Soil Quality standard.

The State of Alaska Water Quality Standards set standards for chemical, physical and biologic parameters of waters on National Forest System Lands. The Forest Service in Region 10 uses Best Management Practices and site-specific prescriptions to meet State of Alaska Water Quality Standards when implementing ground-disturbing activities on National Forest System lands.

Soil and Water Question 1: Are the standards and guidelines for Soil Disturbance being implemented?

The Best Management Practices (BMPs), described in the Soil and Water Conservation Handbook (Forest Service Handbook 2509.22, October 1996), define practices that protect soil and water resources. The Soil and Water standards and guidelines define site-specific measures to protect the resources. These standards and guidelines were monitored following a methodology described in the Tongass Monitoring Strategy. The strategy was developed to provide direction for Tongass Land Management Plan implementation monitoring.

The FY 2001 BMP Monitoring Report provides details on how the monitoring was conducted. This report is included in the Appendix. Additional information on the implementation monitoring is described in Soil and Water Question 3. A summary of the findings for the soil resources relative to disturbance is given below.

The BMP implementation monitoring included two distinct efforts: (1) 100 percent monitoring of the units closed out and roads final completed, and (2) Interdisciplinary Team (IDT) monitoring. The 100 percent monitoring was conducted primarily by Forest Service sale administrators and engineering representatives, with assistance from resource specialists in a few circumstances. The IDT monitoring was conducted by a team of representatives from the Forest Service and other Federal and State agencies, which included sale administrators, engineers, foresters, planners, and resource specialists from soils, water, and fisheries. IDT monitoring was conducted on a stratified random sample made up of more than 10 percent of units and roads monitored during the 100 percent monitoring effort.

The monitoring showed that the Tongass National Forest is implementing the standards and guidelines for soil disturbance successfully. There was one case where BMP application was questioned and no departures were reported relative to soil disturbance BMPs. In a few cases, following the monitoring, action plans were developed to complete additional work to fully implement the BMP.

BMPs Applicable to Soil Disturbance

BMP 12.7/ 14.5/ 14.8 Measures to Minimize Surface Erosion
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.5 Identification & Avoidance of Unstable Areas
BMP 13.9 Yarding Systems to Protect Soil/ Water Resources
BMP 13.10 Landing Location & Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures- Temporary Roads & Units
BMP 14.7/ 14.12 Measures to Minimize Mass Failures/ Control of Excavation & Sidecast
BMP 14.8 Surface Erosion
BMP 14.9 Drainage Control Structures to Minimize Erosion & Sedimentation
BMP 14.18 Control Rock Pit Sediment
BMP 14.20/ 14.22 Road Maintenance/ Access Management
BMP 14.26/ 14.27 LTF Surface Erosion Control Plan, Storm Water Prevention Pollution Plan

Monitoring Results

A total of 91 units and 16 roads were monitored this year through the 100 percent implementation monitoring process. Of these units and roads monitored, 83 units and five roads were in the FY 2001 pool. A subset of the total BMP implementation monitoring pool, consisting of 23 units and 13 roads, was monitored during the 10 percent IDT monitoring process. This subset of units monitored by the IDT included 15 units and five roads from the FY 2001 pool. The tables and statistics discussed below reflect results from the total units and roads monitored in the 100 percent and 10 percent IDT monitoring efforts. Table 2-22 shows the number of times the BMPs specific to soil disturbance were monitored and BMPs were implemented.

Table 2-22. BMPs Implemented: Recorded on Unit and Road Forms

BMPs Applied	Number of Times the BMP was Appropriate for Use	Number of Departures from Full BMP Implementation/ BMP not Applied	Number of Times Corrective Action Implemented
12.7/ 14.5/ 14.8	15	0	1 (6.7%)
12.17	58	1 (1.7%)	1 (1.7%)
13.5	44	0	5 (11.4%)
13.9	87	0	0
13.10	87	0	2 (2.3%)
13.11/ 13.14/ 14.5	74	0	1 (1.3%)
14.7/ 14.12	4	0	0
14.9	11	0	1 (9.1%)
14.18	7	0	0
14.20/ 14.22	13	0	0
14.26/ 14.27	82	0	0
Totals	**482**	**1 (0.2%)**	**11 (2.3%)**

Summary details on the departures by BMP are listed in the BMP Summary Report included in the Appendix. In order to comply with the standards and guidelines, corrective actions were taken during timber sale administration. These corrective actions are also described in the BMP Summary Report.

10 percent IDT Monitoring

The IDT monitoring this year included two different size groups; large groups and small groups. The large group trips focused on review of application of new standards and guidelines as well as issues relative to wildlife, karst, alternative harvest methods, streams, and road decommissioning/storage. The small groups completed the bulk of the 10 percent quality control monitoring on the units. The 10 percent monitoring was completed on four districts in eight geographic areas and ten harvest and road construction areas as listed below:

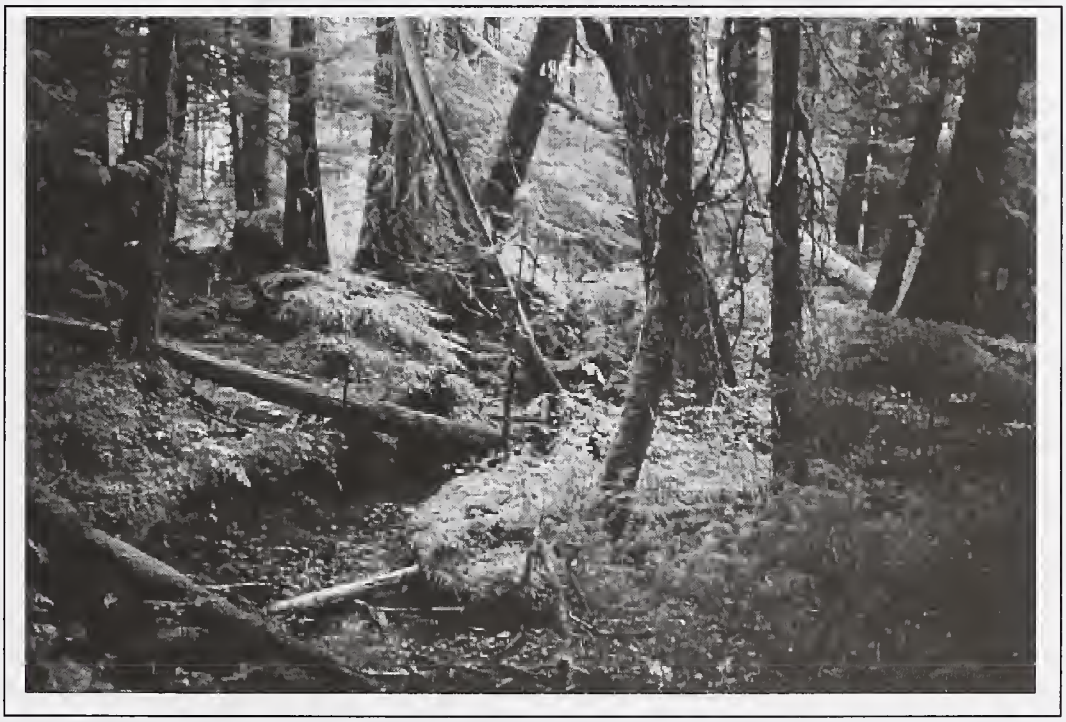
Craig RD: Polk Inlet (West Polk TS Units 613-107, 613-233, 613-248, 613-249), Twelve Mile Arm (East 12 Mile TS Units 619-213, 619-215, 12-Mile LTF): monitored 6 units and 1 LTF.

Thorne Bay RD: Naukati-Sarkar (Chusini TS Unit 1), Heceta Island (Heceta Sawfly TS Units 2, 14, 20), Winter Harbor (decommissioned Roads 2050, 2050500, 2050810, 2050815), North Prince of Wales (decommissioned Roads 21 120.186/120.208, 20 115.417): monitored 4 units and 6 decommissioned roads.

Wrangell RD: Deer Island (Kuakan TS Units 32A, 35B, 35C1, 35C2, 35C3), Etolin island (King George TS Unit 9), Wrangell (Dash Road 5008 Storage, Pats Creek-State Road): monitored 6 units, 1 FS decommissioned road, 1 State road, and 1 LTF.

Petersburg RD: Kake (Shamrock TS Units 429-46, 436-47, 438-1), Portage Bay (Bohemia TS Units 508, 509, 511, Goose TS Unit 538), Petersburg (Manmade Hole Parking Lot, road maintenance 6235, 6245, East Fork TS Road 6227, Dry Straits bridge replacement): monitored 7 units, 4 roads, 1 parking lot, and 1 LTF.

During IDT monitoring, the group noted soil, visual, timber, stream and buffer characteristics relative to the management practices. Specifically in shovel logging units, we looked at soil compaction, soil disturbance, slope gradient limitations, and retention. In the helicopter units, we reviewed partial retention, soil disturbance, visuals, stream buffers and stream disturbance. In the running skyline and high lead-logging units, we focused on streams, buffers, and soil disturbance. In reconstruction of the culverts and bridges, we reviewed the sites relative to fish passage and erosion control. In construction we monitored parking lot construction, timber road construction, and road decommissioning relative to sediment control and culvert installation. In road decommissioning, we monitored relative to culvert/ bridge removal, and erosion on fill slopes and cut slopes. A complete summary of this IDT review can be found in the Appendix.



Summary of Monitoring Results

Generally 10 percent quality control monitoring completed by the IDT showed agreement with the monitoring completed by the sale administrators and engineering representatives. Monitoring showed that Best Management Practices (BMPs) were implemented. The new numerical rating system that summarizes BMP use, number of departures, and corrective actions worked well. This numerical rating served to clarify the split between the ratings and help the group rate the BMP implementation more consistently. The numerical rating system facilitated reflecting on the significance of the departure and the impact on the soil, water, and timber resources. There was minimal confusion identified on completion of the forms and interpretation of the rating system. The new format proved to be a significant improvement.

During the IDT monitoring, the group identified strengths associated with BMP implementation and a few BMPs that need continued emphasis.

Identified strengths of BMP implementation relative to soil disturbance included:

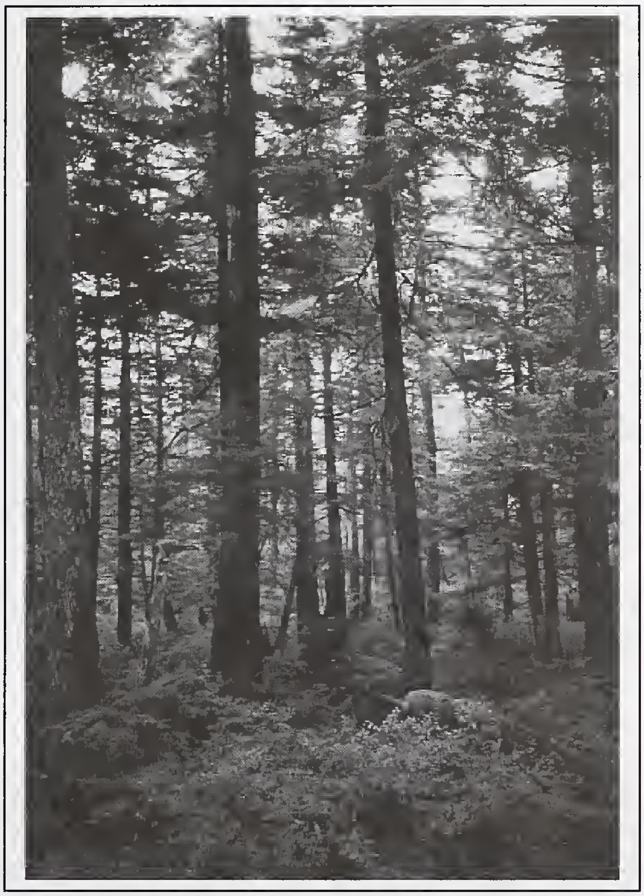
BMP 12.7/ 14.5/ 14.8 Measures to Minimize Surface Erosion
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.5 Identification and Avoidance of Unstable Areas
BMP 13.9 Yarding Systems to Protect Soil/ Water Resources
BMP 13.10 Landing Location and Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads
BMP 14.26/ 14.27 LTF Surface Erosion Control Plan/ Storm Water Pollution Prevention

Identified emphasis items relative to soil disturbance included:

BMP 12.7/ 14.5/ 14.8 Measures to Minimize Surface Erosion
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures on Temporary Roads
BMP 14.14/ 14.17 Culvert Design/ Installation & Removal

High quality work on the part of the sale administrators and layout crews was noted in identifying streams and adding implementation of stream course protection measures for streams that were missed in the planning and layout phases of unit preparation. Extraordinary work was completed on the part of the sale administrators in working with shovel operators as well as helicopter operator. Particularly, they worked to limit soil disturbance and keep retention trees in shovel logging units and retain the designated trees and maintain buffers in the helicopter units. In the shovel units as well as helicopter units, no soil disturbance was apparent. The sale administrators worked closely with the operators in the selective cut/partial retention and salvage units. Some of the units monitored had diameter prescriptions, some had individual trees marked, and some had areas designated for harvest. The sale administrators worked through the contractual process to achieve harvest of these units to remove timber without damage to other trees or the soil resources, and effectively harvest the timber from these units. This work contributed to increase the buffer sizes on streams and wetlands. The harvest monitored in karst terrain showed salvage harvest successfully accomplished without impact to the soil, water, and karst resources. This sale administrator worked closely with the operator to remove the timber in this salvage sale without damaging other trees, karst terrain, soil or stream resources. The sale administrator overseeing the harvest on the salvage unit of blowdown worked with the operator to remove timber while achieving suspension to prevent damage to the soil and stream resources. Emphasis will continue on identifying streams missed during sale preparation, ensuring water bars are functional, and seeding including temporary roads. Particular concerns were mentioned in the units that were developed, laid out, and harvested under the old standards and guidelines in steep terrain. These concerns focused on the suspension requirements prescribed in the unit and the landslides and rock bluffs. Using today's policies, much of the over steep terrain with shallow soils and landslides would have been deleted from the unit. In situations where landslides are present, full suspension should be prescribed and planting vegetation/seeding considered.

During completion of the roads and post haul maintenance, continued emphasis is being placed on BMPs to ensure water bars are installed to minimize erosion and sedimentation and seeding. During road reconstruction and construction involving installation of culverts, special emphasis will be placed on constructing fill slopes that are less steep than the natural angle of repose of the soil and rock fill to prevent raveling and erosion. Emphasis will also be focused on shaping bridge abutments and fills to avoid raveling and erosion.



Evaluation of Results

The standards and guidelines for soil disturbance are being implemented during timber sale administration and road construction. The sale administrators and engineers have a strong understanding of the BMPs and actions necessary to implement the associated standards and guidelines. Continued emphasis is necessary on adequate culvert installations, ditch dams and water bars, and seeding bared soil slopes. Application of partial suspension and full suspension has contributed to limit soil disturbance.

There was general consistency on the rating process on the 100 percent sample. Technical assistance and training with BMP form interpretation on the Tongass National Forest was provided in fiscal year (FY) 2001. In FY01 with decreased unit harvest activity, the most experienced sale administrators were assigned sale administration work. These efforts and the increased experience of the sale administrators with the BMP implementation monitoring contributed to significantly improve our monitoring effort. There was minimal confusion identified on completion of the forms and interpretation of the rating system. The added numerical rating system functioned well to help discriminate the differences in the rating levels. He numerical rating system provided a measuring mechanism to the ratings. The form's new format proved

to be a significant improvement over the previous editions. The data reported was significantly more consistent and complete.

The IDT observed the sale administrators and engineering representatives have a strong understanding of the BMPs, and work to implement these BMPs on the ground. The sale administrators, engineering representatives, and contracting officer's representatives have responsibilities for implementation of many of the BMPs through administering the timber sale and public works contracts. They closely inspect these contracts and work with the operators to ensure compliance with many of the BMPs. Through the hard work and diligent efforts of the sale administrators, engineering representatives and contracting officers representatives, the BMPs are implemented on the ground. The IDT monitoring of the Tongass this year shows that the sale administrators, engineering representatives, and contracting officers representatives are consistently implementing these BMPs fully and monitoring them following the same criteria as the IDT. This is a trend that has continued to improve over the past three years until we are now nearly at 100 percent full implementation of the BMPs. We need to consider moving toward monitoring a smaller subset of the roads and units.

The IDT recommends focusing on emphasis items rather than the specific rating for the BMP. The group feels that this trip should be a communication opportunity to discuss interpretation of implementation of the BMPs. The group does not feel that it is significant to focus on the specific ratings. The orientation of the group is toward interpretation and implementation rather than a rigorous inspection of detail.

Recommendations to have two groups, a larger and smaller IDT group, were implemented this year. This large and small group approach seemed to be effective, although in a year where harvest was limited early in the season due to court decisions, there were not very many units from the 2001 pool to monitor. We monitored over 10 percent of the units and roads. There were some form filling out compliance issues, the forms from the Petersburg IDT trips were not completed separately from the 100 percent forms. In an effort to remedy this problem, strict guidelines will be routed prior to the IDT review.

This monitoring question is covered in its entirety in the annual BMP monitoring report. In this report, it is duplicated as Soil and Water Question 1, Fish Question 2, and Wetlands Question 1.

Soil and Water Question 2: Are the standards and guidelines effective in meeting Alaska Regional Soil Quality Standards?

Soil and water effectiveness monitoring is completed through monitoring the soil quality standards as described in Forest Service Manual 2554, and is summarized in this report.

This question is addressed in two parts: 1) Soil Disturbance, and 2) Landslide inventory.

Part 1: Soil Disturbance

The effectiveness of Forest Plan standards and guidelines and BMPs in preventing excessive soil disturbance due to timber harvest activities has been monitored on the Tongass National Forest since the Regional Soil Quality Standards were established in 1992. A statistical review of two sets of this data taken on Prince of Wales Island was completed in 1999, and was summarized in the Year 2000 Forest Plan Monitoring Report.

The data collected on Prince of Wales Island is in general agreement with similar data collected on the Wrangell and Petersburg Ranger Districts. It clearly indicates that all timber harvest units, including cable, helicopter and shovel yarding systems, are within the established standard of less than 15 percent detrimental soil disturbance.

There is no need to continue collecting this data on routine harvest units. However, some additional monitoring may be desirable on a project-specific basis, as identified during an environmental analysis.

Part 2: Landslide Inventory Guidelines

The objective of this monitoring effort is to determine the effectiveness of Forest Plan Standards and Guidelines for the identification and management of potentially unstable slopes.

Forest Plan (1997) Soil and Water Standards and Guidelines (1. A. 5) state that, at the forest plan level, slope gradients of 72 percent or more are removed from the tentatively suitable timber base due to high risk of mass movement. At the project planning level, the Forest Supervisor or District Ranger may approve timber harvest on slopes of 72 percent or more on a case-by-case basis, based on the results of an on-site analysis of slope stability.

BMP 13.5 (Identification and Avoidance of Unstable Areas) essentially reiterates the Forest Plan standard.

The policy regarding the management of steep slopes has not changed appreciably on the Tongass since 1977. The former Forest Plan (Tongass Land Management Plan [TLMP] 1979) used a maximum slope of 75 percent to define suitable forestland and includes Southeast Alaska Area Guide (1977) policy #6, which states that “logging or roading will not be done on slopes greater than 75 percent unless approved in advance by the Forest Supervisor following IDT planning.”

To determine how effective this standard has been in minimizing the frequency of management-related landslides, we will use the power of GIS to develop forest-wide information on landslide frequency and location relative to roads and managed stands, particularly those managed stands on steep slopes. Specifically we intend to quantify what has happened on those steep areas (greater than 72 percent slopes, or greater than 75 percent slopes) that we have logged since implementation of these forest plan standards.

Monitoring Results

In FY 2001 we began an inventory to identify, delineate, and digitize all landslides on the Tongass National Forest. Landslides are being digitized as an independent layer in GIS. This effort incorporates all existing project level landslide inventories, as well as the older forest-wide inventories conducted by the Forestry Sciences Laboratory. The existing data will be verified and digitized.

An inventory protocol was developed and tested on Wrangell Island in the fall of 2001. Additional inventory was conducted on Mitkof Island. Plans are to complete the inventory of Wrangell, Petersburg,

Ketchikan, Thorne Bay, and Craig Ranger Districts in 2002. The new inventory will be maintained and updated regularly.

In addition to answering this monitoring question, the inventory will be used for a number of other purposes, such as for watershed assessments, watershed restoration, and project-level environmental analysis. Also, analysis of this digital landslide information in conjunction with other GIS data will provide additional insight about the relationship of mass wasting to other variables including landform, bedrock lithology, elevation, aspect, soil type, and vegetation type.

Soil and Water Question 3: Are Best Management Practices being implemented?

The Best Management Practices (BMPs) were monitored on the Tongass National Forest, using guidelines described in the Tongass Monitoring Strategy. The strategy was developed to provide direction for Forest Plan implementation monitoring. An interagency team of representatives from the Forest Service and Alaska Department of Environmental Conservation selected specific BMPs to be monitored, based upon potential risk factors to soil and water resources. Members of the Monitoring and Evaluation Group (IMEG) then reviewed their selection. The BMPs evaluated are included in the Soil and Water Conservation Handbook (Forest Service Handbook 2509.22, October 1996). Soil and water effectiveness monitoring is completed through monitoring the soil quality standards as described in Forest Service Manual 2554, and is summarized in this report.

The BMP implementation monitoring included two distinct efforts: (1) 100 percent monitoring of the units closed out and roads completed, and (2) 10 percent interdisciplinary team (IDT) monitoring. The 100 percent monitoring was conducted primarily by Forest Service sale administrators and engineering representatives, with assistance from resource specialists in a few circumstances. A team of representatives from the Forest Service and other Federal and State agencies conducted the IDT monitoring. This team included sale administrators, engineers, foresters, planners, and resource specialists from soils, water and fisheries. IDT monitoring was conducted on a stratified random sample made up of more than 10 percent of units and roads monitored during the 100 percent monitoring effort

The monitoring showed that the Tongass National Forest is implementing the Best Management Practices successfully. There were few departures from full implementation that were noted. In a few cases, following the monitoring, action plans were developed to complete additional work to fully implement the BMP.

Monitoring Context

Planning for some of the roads and units was completed before the Soil and Water Conservation Handbook was revised in October 1996, and new Forest Plan standards and guidelines were approved in May 1997. Both documents included many improvements for protecting soil and water resources. Several important changes in the 1996 Soil and Water Conservation Handbook include improving wetlands management direction, considering stream buffer windthrow, and generally making Forest Service BMPs consistent with State Forest Practices Regulations. A few of the important changes included in the 1997 Forest Plan FEIS and the revised Forest Plan standards and guidelines resulted in new stream class definitions, and stream protection measures required for each stream class and channel type. Buffer strip protection of Class III streams was entirely new.

Applicable BMPs

BMP 12.5 Wetlands Protection Measures
BMP 12.6/ 12.6a Riparian Area Designation & Protection/ Buffer Zone Design and Layout
BMP 12.7/ 14.5/14.8 Measures to Minimize Surface Erosion
BMP 12.8/ 12.9 Oil Pollution Control Measures
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.5 Identification and Avoidance of Unstable Areas
BMP 13.9 Yarding Systems to Protect Soil/ Water Resources
BMP 13.10 Landing Location and Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads
BMP 13.16 Stream Channel Protection
BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription
BMP 14.7/14.12 Measures to Minimize Mass Failures/ Control of Excavation & Sidecast
BMP 14.9 Drainage Control Structures to Minimize Erosion & Sedimentation
BMP 14.14/ 14.17 Design & Installation of Bridges and Culverts
BMP 14.18 Control Rock Pit Sediment
BMP 14.20/ 14.22 Road Maintenance Access Management
BMP 14.26/ 14.27 LTF Surface Erosion Control Plan, Storm Water Pollution Prevention Plan

Monitoring Results

A total of 91 units and 16 roads were monitored this year through the 100 percent implementation monitoring process. Of these units and roads monitored, 83 units and five roads were in the FY 2001 pool. A subset of the total BMP implementation monitoring pool consisting of 23 units and 13 roads was monitored during the 10 percent IDT monitoring process. The subset of units monitored by the IDT included 15 units and five roads from the FY 2001 pool. The tables and statistics discussed below reflect results from the total units and roads monitored in the 100 percent and 10 percent IDT monitoring efforts. This monitoring covered 2,855.5 acres of harvest units.

The implementation monitoring results are summarized in Table 2-23. This table displays the total number of times each specific BMP was rated, number of times it was fully implemented, number of times it showed a departure from full implementation, and the number of times departures from full implementation of BMPs were corrected. In most cases, corrective action was taken so that the BMP was fully implemented before either the sale administrator or contracting officer's representative approved the unit or road. In a few cases, the monitoring resulted in action plans being drawn up to complete additional work so the BMP would be fully implemented.

Table 2-23. Summary of BMP Use, Number of Departures, and Corrective Actions

BMPs Applied	Number of Times the BMP was Appropriate for Use	Number of Departures from BMP Implementation/ BMP not implemented	Number of Times Corrective Action Implemented
12.5	37	0	2 (5.4%)
12.6/ 12.6a	64	0	0
12.8/ 12.9	99	0	0
12.17	58	1 (1.7%)	1 (1.7%)
13.5	44	0	5 (11.4%)
13.9	87	0	0
13.10	87	0	2 (2.3%)
13.11/13.14/14.5	74	0	1 (1.4%)
13.16	69	0	5 (7.2%)
12.7/ 14.5/ 14.8	15	0	1 (6.7%)
14.6	10	1 (10%)	0
14.7/14.12	4	0	0
14.9	11	0	1 (9.1%)
14.14/ 14.17	14	0	1 (7.1%)
14.18	7	0	0
14.20/ 14.22	13	0	0
14.26/ 14.27	82	0	0
Totals	**775**	**2 (0.3%)**	**19 (2.4%)**

The IDT monitoring this year included two different size groups, large groups and small groups. The large group trips focused on review of application of new standards and guidelines as well as issues relative to wildlife, karst, alternative harvest methods, streams, and road decommissioning/storage. The small groups completed the bulk of the 10 percent quality control monitoring on the units. The 10 percent monitoring was completed on four districts in eight geographic areas and ten harvest and road construction areas on the Craig, Thorne Bay, Wrangell, and Petersburg Ranger Districts. The Interagency Monitoring and Evaluation Group (IMEG) selected the monitoring locations based on significant aspects of the unit harvest and road construction associated with these areas.

A subset of the total BMP implementation monitoring pool consisting of 23 units and 13 roads was monitored during the 10 percent IDT monitoring process. This subset of the total BMP implementation monitoring pool consisted of 15 units and five roads from the FY 2001 pool. The IDT monitoring data from the 2001 pool was used to compare ratings and stream and buffer delineation. The total IDT subset data was used for evaluation of departures from BMP implementation as well as identification of strengths and emphasis items associated with BMP implementation. Specific details about this monitoring effort are summarized in the Soil and Water Question #1 and in the BMP report in the Appendix.

Generally, 10 percent quality control monitoring completed by the IDT was in agreement with the monitoring completed by the sale administrator and engineering representative, and showed that the BMPs were being implemented. The variation lied in differences of degree of BMP implementation. Evaluation of these ratings shows the sale administrators and contracting officer's representatives were more stringent in their ratings than the IDT and more precise in measuring stream lengths/buffers.

During IDT monitoring, the group identified strengths associated with BMP implementation and a few BMPs that need continued emphasis. Identified strengths of BMP implementation included:

- riparian area designation and implementation of buffers;
- stream channel protection;
- measures to minimize soil erosion;
- revegetation of disturbed areas;
- identification and avoidance of unstable areas;
- yarding systems to protect soil and water resources;
- landing locations and design;
- timing restrictions for construction activities/ fisheries prescription;
- design and installation of culverts;
- erosion control measures and plans;
- oil pollution control measures; and
- LTF surface erosion control/ storm water pollution prevention.

In the harvest units, continued emphasis is focused on minimizing soil disturbance during yarding operations and associated mitigation covering bared soil with vegetative debris and seeding. Emphasis is also being placed on BMPs to ensure road/ ditch maintenance, seeding of temporary roads, and cross drains function when temporary roads are closed.

During completion of the roads, continued emphasis is being placed on seeding soil exposed in road cuts and providing required fish passage at culvert sites. Focus on the design of the culverts/bridges specific to the site will be emphasized on sites where structures are being replaced or removed. At these sites, detailed survey and investigation could provide data for designing slope gradients to minimize erosion and ravel into the stream courses.

Overall, the sale administrators and engineering representatives demonstrated diligence in implementing appropriate protection of the stream courses, as well as prescribed suspension, effective culvert/water bar installation, and minimization of sedimentation. The terrain in some of these units was excessively steep, requiring extensive efforts on the part of the sale administrators to implement the BMPs. The sale administrators worked carefully to identify streams missed during the environmental assessments and

during layout, and implemented the appropriate stream protection measures. The sale administrators worked closely with the contractors on some of the shovel units to employ this logging system on relatively steep ground and effectively remove the logs with minimal disturbance to the soils and forested wetlands.

There were numerous cases where the 10 percent IDT identified strengths and a few cases of concerns. These strengths and concerns are summarized in the tables included in the BMP Summary Report in the Appendix.

The IDT identified strengths associated with the following BMPS:

BMP 12.5 Wetlands Protection Measures
BMP 12.6/ 12.6a Riparian Area Designation & Protection/ Buffer Zone Design and Layout
BMP 12.7/ 14.5/14.8 Measures to Minimize Surface Erosion
BMP 12.8/ 12.9 Oil Pollution Control Measures
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.5 Identification and Avoidance of Unstable Areas
BMP 13.9 Yarding Systems to Protect Soil/ Water Resources
BMP 13.10 Landing Location and Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads
BMP 13.16 Stream Channel Protection
BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription
BMP 14.14/ 14.17 Design & Installation of Bridges and Culverts
BMP 14.26/ 14.27 LTF Surface Erosion Control Plan, Storm Water Pollution Prevention Plan

Emphasis items were associated with the following BMPs:

BMP 12.17 Revegetation of Disturbed Areas
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads
BMP 14.6 Timing Restrictions for Construction Activities/Fisheries Prescriptions
BMP 14.14/ 14.17 Design & Installation of Bridges and Culverts

10 Percent IDT Best Management Practices Monitoring Trip: Hoonah

Monitoring was completed during FY 2001 in Hoonah in response to the findings and recommended actions from the IDT trip to Hoonah in FY 2000. Refer to the appendix for a summary of these findings and recommendations.

Evaluation of Results

The results show that the Tongass has successfully implemented the Best Management Practices and is continuing to improve on implementing the BMPs as well as documenting the BMP monitoring. Specific details on the situations that were associated with the departures and lack of implementation as well as corrective actions taken in response to efforts to implement the BMPs are detailed in the BMP Summary Report included in the Appendix.

Overall, the monitoring showed that the Tongass National Forest is implementing the Best Management Practices successfully. There was general agreement between the 100 percent monitoring effort and the 10 percent IDT monitoring effort. There was one departure from full BMP implementation noted and one case where there was question as to whether the BMP was implemented. The departure occurred on a road where a culvert was installed, with permission from Forest Service and Alaska Department of Fish and Game biologists, outside the fish-timing window. This particular culvert was replaced in an effort to improve fish passage at the site and the contracting officer's representative made the request for installation outside the timing window during construction. The situation where question was raised over whether the BMPs were implemented involved a unit where landslides were shown in the unit. This particular unit was planned, laid out and harvested under the old standards and guidelines. A soil scientist's report on the unit shows prescription for full suspension over the upper portions of the slide and partial suspension over the lower portions of the slide. Full suspension over the top part of the slide was achieved through helicopter logging. Full suspension to partial suspension was achieved over the lower portions of the slide. During IDT review, the soil specialist and hydrologist felt the BMP was not applied. These two members questioned whether planting should have been addressed in the soils prescription. Other members of the group felt that because the landslides were addressed in the soils report and a site specific prescription was developed for this unit and the District Ranger signed off on this prescription, the BMP was applied. If this unit was planned, laid out, and harvested under the new standards and guidelines, using today's policies, the overstep terrain with the shallow soils and the landslide areas would have been deleted from the unit.

In summary, the sale administrators and engineering representatives have a strong understanding of the Best Management Practices (BMPs) and work to implement these BMPs on the ground. The sale administrators, engineering representatives, and contracting officer's representatives have responsibilities for implementation of many of the BMPs. Through the hard work and diligent efforts of the sale administrators, engineering representatives and contracting officers representatives, the BMPS are implemented on the ground.

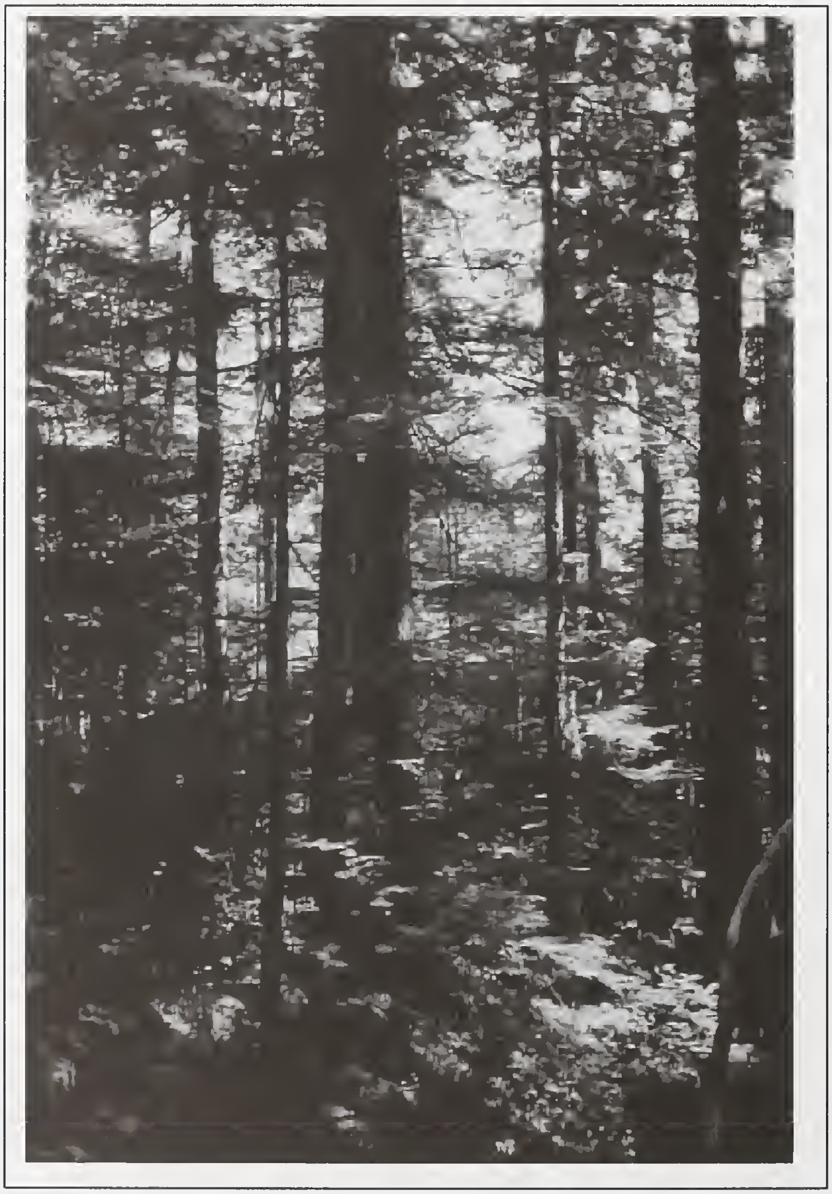
The IDT monitoring of the Tongass this year shows that the sale administrators, engineering representatives, and contracting officers representatives are consistently implementing these BMPs fully and monitoring the following the same criteria as the IDT. This is a trend that has continued to improve over the past four years until we are now nearly at 100 percent full implementation of the BMPs. We need to consider moving toward monitoring a smaller subset of the roads and units.

The IDT recommends focusing on emphasis items rather than the specific rating for the BMP. The group feels that this trip should be a communication opportunity to discuss interpretation of implementation of the BMPs. The group does not feel that it is significant to focus on the specific ratings. The orientation of the group is toward interpretation and implementation rather than a rigorous inspection of detail. The group feels that a more distinct feedback system needs to be developed to get information from monitoring back to the planning, design, layout, and contract preparation groups.

Recommendations to simplify the monitoring form and break the IDT review into two groups were completed this year. These two groups consisted of a large group that focused on issues primarily but also completed some of the IDT 10 percent quality control monitoring and a small group that completed the bulk of the IDT 10 percent quality control monitoring. This two-group approach seemed to work effectively and should be continued if time and budgets can accommodate this level of monitoring. This year we also added additional Forest biologists, hydrologists, and timber logging specialists. These additional specialists contributed insight on the resources as well as logging systems designs and capabilities. If funding and personnel are available, recommendations follow to include these specialists. The criteria for selecting the units and roads for IDT review should continue to emphasize the areas

showing steeper slopes and Class I, II, III, and IV streams. The larger IDT group comprised of FS staff, FS specialists, monitoring coordinator, and representatives should review areas that illustrate implementation of new or controversial standards and guides, timber harvest, and road construction sites during actual implementation of the BMPS and standards and guidelines.

Recommendations specific to the monitoring form were completed prior to the FY01 field season. An additional attribute was added to the rating system to help delineate the differences between the ratings. This attribute further described the rating system for the BMP implementation indicating the percentage of full BMP implementation (e.g. ratings included a 0-5 reflecting the degree of implementation) in addition to the fully implemented (Y), departure (D), not implemented (N) system. The form was also simplified to require fewer entries. Further direction was provided on what constitutes a departure. These changes contributed to more consistency in monitoring and form completion.



Soil and Water Question 4: Are Best Management Practices effective in meeting water quality standards?

Goal: Protect beneficial uses of water including drinking water, and growth and propagation of fish, other aquatic life, and wildlife.

Objective: Study a representative sample of projects where Best Management Practices (BMPs) have been implemented, to determine if BMPs are effective in meeting State water quality criteria (e.g., turbidity, sediment, temperature) or in maintaining physical habitat condition (e.g., gravel embeddedness, pool depth). This monitoring issue is closely related to the fish and riparian effectiveness monitoring information also presented in this report.

Background: Forest roads can have adverse effects on aquatic life, resulting from accelerated erosion and sediment loading, alteration in natural drainage patterns, changes in channel morphology, and increased risk of chemical spills and contamination.[1] The primary focus of FY 2001 water quality monitoring on the Tongass was the effectiveness of road BMPs in mitigating erosion and stream sedimentation, because of potentially significant effects on the growth and propagation of aquatic organisms. Stream temperature monitoring in FY 2001 was also conducted in selected watersheds on Prince of Wales (POW) Island to determine if summer stream temperatures are within State water quality standards. The POW stream temperature program was developed in response to public concerns over large spawning salmon die-offs that occurred in 1993.

Monitoring Results

Water quality monitoring activities reported in FY 2001 include stream turbidity associated with culvert and bridge installation, stream temperature in temperature sensitive watersheds on Prince of Wales Island, and one incident of water quality degradation observed during road maintenance activities on Mitkof Island.

<u>Stream Turbidity</u>

Stream turbidity monitoring during road construction activity is a simple, low-cost observation of a water quality standard that responds to routine BMP effectiveness monitoring outlined in the USDA Forest Service Memorandum of Agreement with the Alaska Department of Environmental Conservation (1992). The objective of turbidity sampling is to determine if Best Management Practices are effective in achieving state water quality criteria for turbidity.

The waters within the Tongass National Forest are classified for multiple beneficial uses (water supply, water recreation, and growth and propagation of fish, shellfish, and other aquatic life and wildlife (Alaska Water Quality Standards 18AAC70, as amended through May 27, 1999). If water bodies are protected for more than one use class, the most stringent water quality criteria for all included use classes apply. For turbidity, the most stringent criteria is

> "May not exceed 5 NTU (nephelometric turbidity units) above natural conditions when the background turbidity is 50 NTU or less, and may not have more than 10% increase in turbidity when the natural turbidity is more than 50 NTU, not to exceed a maximum increase of 25 NTU."

Very little road construction or reconstruction activity took place on the Tongass National Forest in FY 2001. Thirteen new or replaced drainage structures met the criteria for turbidity monitoring according to the turbidity monitoring protocol (Tongass National Forest Monitoring and Evaluation Guidebook, 2000).

[1] *Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats.* American Fisheries Society Special Publication 19:297-323, 1991.

Turbidity data were reported at one site, a culvert replaced on Ohmer Creek on Mitkof Island. Table 2-24 (TURBIDITY 2) displays results for this site. Turbidity samples were collected according to the protocol: prior to construction and approximately 48 hours after construction was complete, using grab samples and a portable turbidity meter.

Table 2-24. (TURBIDITY 2) — Turbidity Monitoring Results for Petersburg Ranger District in FY 2001

Station I.D.	Date	Upstream Turbidity (NTU)	Down-stream Turbidity (NTU)	Water Quality Criteria Exceeded?	Construction Type	Site Conditions	Time Relative to Construction
Mitkof 40010	8/24/ 2001	0.80	1.07	No	Culvert replacement	Not recorded	120 hours prior to construction start
Same as above	9/6/ 2001	0.91	1.49	No	Same as above	Light rain (0.25 in.)	64 hrs after construction complete

Results indicate that Best Management Practices for drainage structure installation were effective in achieving water quality criteria within 64 hours after construction was completed at this site.

Evaluation of Results

Turbidity data reported in FY 2001 demonstrates compliance with state water quality criteria shortly after drainage structure installation was completed at one site on Mitkof Island. No corrective actions were necessary.

The turbidity sampling protocol requires turbidity measurements at a minimum of 40 percent of culverts greater than 48" diameter. It has been commonly accepted that samples will be collected at bridge construction sites as well. Forest-wide, at least six sites should have been sampled in FY 2001. Although the potential population of this data set was very small in FY 2001, additional sites could have provided more reliable results relative to the range of projects and conditions encountered during drainage structure installation activities across the Forest.

The following actions are recommended for turbidity monitoring in FY2002.

1. Clarify turbidity protocol to include turbidity measurements associated with large culverts and all bridges during new construction, and replacement. Consider collecting turbidity data for all instream activities, including fish habitat enhancement work. This would increase the potential dataset for the turbidity parameter and improve the reliability of results over a wide range of projects that cause instream disturbance.

2. Employ a random selection strategy for at least a subset of instream projects. This would improve the representative nature of the data and minimize potential bias associated with weather conditions or other logistical factors.

3. Clarify turbidity protocol to include sampling within 48 hours after the start of construction. Include specific protocol for monitoring turbidity at sites that are de-watered.

4. Emphasize pre-season (early spring) contact with each district and the Supervisor's Office structures group to identify the pool of projects requiring turbidity monitoring. This could facilitate random selection of sample sites. Ensure that personnel are available on-site for each project to collect samples according to the protocol.

Stream Temperature

Stream temperature data were collected at sites across the Tongass National Forest in FY 2001 for a variety of reasons, none of which at this time directly address the effectiveness of Best Management Practices currently implemented under the Forest Plan. Nevertheless, results are summarized here as an annual compilation of ongoing efforts to evaluate long-term trends in this water quality standard. On Prince of Wales Island, about twenty stream temperature-monitoring sites have been established primarily in response to fish kills that occurred during low streamflow events in the late 1980s and early 1990s. Two similar sites were established on the Ketchikan-Misty Ranger District. Stream temperature data are also collected at some USGS stream gage sites and in conjunction with a variety of fisheries improvement and research projects across the Tongass National Forest.

Data were reported from eighteen sites in FY 2001. Table 2-25 (TEMP1) lists the sites and summarizes site characteristics. Most of the sites are located in relatively large watersheds. Old Franks, Old Toms, Rio Roberts, Sunny, and Saltery sites could be considered reference sites since these watersheds have not been harvested. All of the other watersheds had extensive riparian harvest prior to 1992. All temperature monitoring sites used recording thermographs installed in deep pools. Deep pools are considered the last refuge for fish when stream temperatures reach lethal limits. The original objective for collecting stream temperature data was to identify the most limiting temperature conditions in these refugia. In addition, equipment installed in deep pools is less likely to be disturbed or displaced by people, wildlife, flooding and ice break-up. Continuous stream and air temperature data are available for Water Year 2001 for most stations. Equipment problems resulted in data loss from some sites.

Table 2-25. (TEMP1) – Stream Temperature Monitoring Sites Reported in FY 2001

Site Name	Ranger District	Riparian Harvest Upstream of Site (yes/no)	Watershed Area Upstream of Site (square miles)	Comments
Cable	Craig	Yes	>10	Harvested in 1970s
Harris (lower)	Craig	Yes	>10	Harvested in 1960s
Harris (upper)	Craig	Yes	>10	Harvested in 1960s
Hatchery	Thorne Bay	Yes	>10	Site located downstream of extensive lake system
Luck	Thorne Bay	Yes	<10	Site located upstream of lake
Old Franks (lower)	Craig	No	>10	Site located downstream of extensive lake system
Old Franks (upper)	Craig	No	>10	Site located upstream of lakes
Old Toms	Craig	No	<10	Research Natural Area
Ratz	Thorne Bay	Yes	<10	Site located downstream of lake
Rio Beaver	Thorne Bay	Yes	>10	
Rio Roberts	Thorne Bay	No	>10	Research Natural Area
Saltery	Craig	No	<10	No harvest in watershed
Shaheen	Thorne Bay	Yes	>10	
Staney	Thorne Bay	Yes	>10	Site located near USGS stream gage
Staney (USGS)	Thorne Bay	Yes	>10	Site located at USGS stream gage
South Staney	Thorne Bay	Yes	<10	
Sunny	Craig	No	<10	No harvest in watershed
North Thorne	Thorne Bay	Yes	>10	

Waters within the Tongass National Forest are classified for multiple beneficial uses (water supply, recreation, and growth and propagation of fish, shellfish, and other aquatic life and wildlife (18 AAC 70.20(a)). Since the waters are protected for more than one use class, the most stringent criterion applies (17 AAC 70.040). For temperature, the most stringent criterion for spawning areas and egg and fry incubation areas, where maximum temperatures may not exceed 13 degrees C. Since data collection (in deep pools) generally avoided these areas, results are compared to the 15 degrees C criteria more applicable to pool habitat.

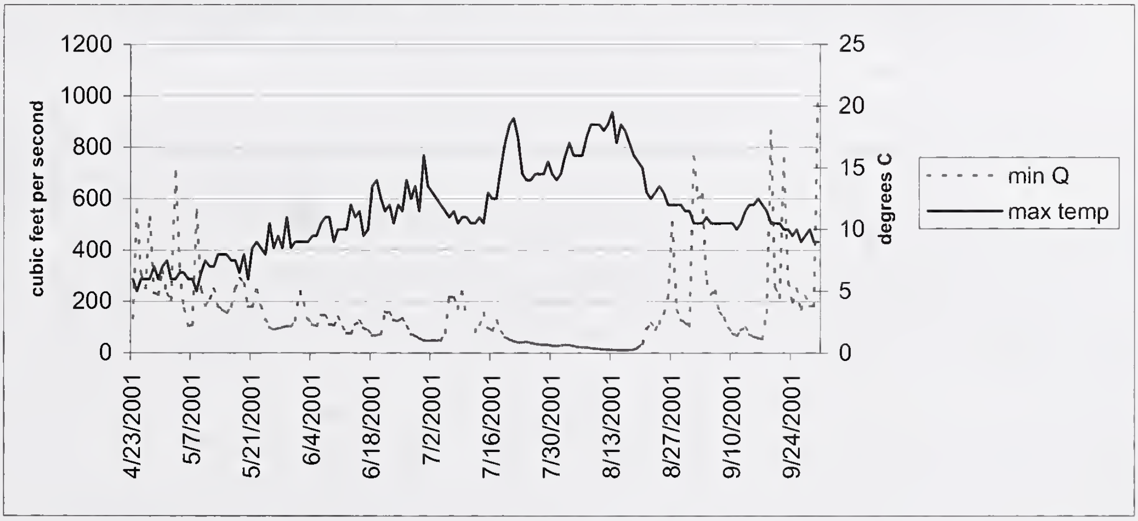
Stream temperatures exceeded water quality criteria at all but two sites reported in FY 2001. Table 2-26 (TEMP2) summarizes temperature data for each site. The highest stream temperature was recorded at Staney and lower Old Franks. Lower Old Franks experienced the most days of maximum stream temperature exceeding 15 degrees C. Hatchery and lower Old Franks sites are located downstream of extensive lake systems that would strongly influence stream temperature regimes at these sites.

Table 2-26. (TEMP2) – Summary of FY 2001 Stream Temperature Data

Site Name	Maximum Temperature (degrees C)	Duration(s) of Maximum Daily Temperature Exceeding 15 degrees C	Cumulative Days Maximum Daily Temperature Exceeding 15 degrees C	Average Temperature Range Jun-Aug (degrees C)	Comments
Cable	21	Aug 7-19 Sep 26-28	15	11-13	
Harris (lower)	16	Aug 9-17	9	8-13	
Harris (upper)	16	Jul 20-21	2	9-11	Air temperatures highest in August
Hatchery	20	Jul 24-Aug 22	30	16-17	Data missing prior to Jul 24 Max temp recorded Aug 9
Luck	15	Not applicable	Not applicable	7-12	Max temp recorded Aug 16
Old Franks (lower)	22	Jun 15-Aug 28	73	14-22	
Old Franks (upper)	15	Not applicable	Not applicable	7-11	
Old Toms	16	Jul 20-21 Aug 9-15	9	9-12	
Ratz	21	Jun 26-Jul 6 Jul 12 Jul 18-Aug 20	46	12-15	Max temp recorded Jul 21
Rio Beaver	17	Jul 19-21 Aug 8-16	12	9-12	Max temp recorded Aug 15
Rio Roberts	16	Jul 21 Aug 12-13 Aug 15	4	9-12	Max temp recorded Aug 15
Saltery	20	Jun 30-Jul 1 Jul 19-26 Aug 8-17	18	10-13	Temperature sensor probably not totally submerged
Shaheen	16	Jul 19-21 Aug 8-13 Aug 15-16	11	9-13	Max temp recorded Aug 15
Staney	22	Jun 18-19 Jun 26 Jun 28 Jun 30-Jul 1 Jul 18-22 Jul 24-30 Aug 1-19	38	11-15	Max temp recorded Jul 21
Staney (USGS)	20	Jun 30 Jul 18-22 Jul 29 Aug 2-19	26	10-14	Max temp recorded Aug 13, provisional data subject to revision by USGS
South Staney	22	Jun 26 Jun 30 Jul 19-22 Jul 25-30 Aug 1-19	32	10-14	Max temp recorded Aug 13
Sunny	16	Aug 11-12	2	8-13	
North Thorne	18	Jul 20-21 Aug 8-18	11	8-13	Max temp recorded Aug 15

An examination of National Weather Service data from Klawock, located somewhat centrally of the reported stream temperature sites on Prince of Wales Island, as well as streamflow data from the United States Geological Survey at Staney Creek, allows a comparison of high stream temperatures with local climate and streamflow data in 2001. Less than 0.75 inches of rain fell in a one-month period (including 18 days of no measurable rainfall) between July 17 and August 18, 2001. Maximum daily air temperature at Klawock ranged from 13 to 23 degrees C during this time. Maximum daily air temperatures at stream temperature monitoring sites ranged from 20 to 27 degrees C during this time, with a peak maximum air temperature recorded at the North Thorne site. This relatively rainless, warm season resulted in extremely low stream flows observed across Prince of Wales Island. Provisional data from the USGS stream gage on Staney Creek for 2001 show very low streamflow for a ten-day period in mid August. From August 9 to 18, minimum daily flow was as low as 11 cubic feet per second, about 17 percent of the median daily streamflow for this time (based on eleven years of record). Figure 5 (TEMP1) displays daily streamflow and maximum temperature data from the USGS station on Staney Creek. This low flow period corresponds to the maximum stream temperatures recorded in Staney Creek and other temperature monitoring sites on Prince of Wales Island.

Figure 2-1. (TEMP1) – Comparison of USGS Provisional Data for Minimum Streamflow and Maximum Stream Temperature at Staney Creek



Alaska Department of Fish and Game personnel reported widespread fish kills throughout Staney Creek and Thorne River in mid- to late August 2001. Up to 50,000 dead fish were estimated in each watershed (Doherty, 2001[2]). The fish kills also correspond with the low streamflow and high temperature events in these watersheds.

Because the riparian areas for six-stream temperature monitoring sites are intact and assumed to be properly functioning, they may serve as reference sites in this data set. However, an examination of this single year of data does not discern obvious differences between reference sites and sites with extensive riparian harvest. No notable differences in maximum temperature were observed. The two sites that did achieve water quality criteria for maximum temperature represent both reference (upper Old Franks) and riparian harvest (Luck) conditions. Nor is there any difference in summer month mean temperature between the two kinds of sites.

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[2] Phil Doherty (ADFG), personal communication (January 9, 2002)

Evaluation of Results

Stream temperatures at most streams monitored on Prince of Wales Island exceeded state water quality criteria for maximum temperature several times during the summer of 2001. A thorough comparison of reference sites and sites with extensive riparian harvest is not possible with the data available at this time. Furthermore, a single year of data is not adequate to evaluate these results with respect to the influence of intact riparian forest on stream temperature. The current data collection sites focus on identifying lethal temperatures in deep pools. In the future, it may be appropriate to consider additional temperature measurements in nearby riffles to provide better information with respect to the most stringent water quality criteria.

In the summer of 2001, high stream temperatures corresponded to high air temperatures, low rainfall, and low streamflow events. Fish kills were reported in Staney Creek and Thorne River and can be attributed to these conditions. Previous research on stream temperature influences on fish kills (AWGFF, 1991[3]) suggests that low dissolved oxygen levels associated with very low volume stream flow is the greatest factor influencing large fish kills in Southeast Alaska. In this study low dissolved oxygen levels were attributed to low stream discharge and high fish abundance (high respiration rates), and occurred even where stream temperatures were within water quality criteria. Higher stream temperatures are common during summer low flow periods and do play a role in limiting the amount of dissolved oxygen present in the water column. Furthermore, analysis of long-term stream flow information from Prince of Wales Island indicates decadal climatic cycles have a significant influence on the frequency and duration of low-flow events (Neal, 2000[4]). This finding highlights the need for long-term data to detect and discuss the influence of climate on stream temperature and the fish die-off issue.

Maximum stream temperatures occurring on Prince of Wales Island in 2001 are more closely related to climate influence than implementation or effectiveness of current Forest Plan standards and guidelines. The link between stream temperature and current Forest Plan standards and guidelines may be oblique or even non-existent. Hyporheic processes and riparian stand conditions (deciduous versus coniferous) probably play significant roles in moderating stream temperatures and are not considered here. However, in the context of cumulative effects analysis, continued management, and restoration of watersheds with extensive past riparian harvest, a continued effort toward understanding stream temperature regimes is justified. The following actions are recommended for stream temperature monitoring in 2002.

- Establish a formal Tongass-wide stream temperature-monitoring program with clearly developed long-term program goals relevant to water quality criteria as well as fish kill events.
- Ensure that a range of riparian characteristics--from unmanaged old growth (reference sites) to extensively harvested watersheds--are included in the program. Consider the appropriateness of existing sites as well as the need to establish new sites to address water quality criteria as well as fish kill objectives.
- Consider collecting additional data at selected stream temperature monitoring sites including summer low-flow discharge measurements, stream temperature in nearby spawning, egg and fry incubation areas (nearby riffles), and dissolved oxygen.
- Contact each district conducting stream temperature monitoring in early spring to coordinate program objectives and consider revised data collection protocols.

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[3] Factors Affecting Pink Salmon Pre-Spawning Mortality in Southeast Alaska, Alaska Working Group on Cooperative Forestry and Fisheries Research, Tech. Report 91-01, November 1991.
[4] Ed Neal (USGS) correspondence to Steve Paustian (July 28, 2000)

Water Quality Degradation

Observing and documenting water quality degradation during resource management activities is a Forest Service responsibility in the Memorandum of Agreement between the Forest Service and ADEC. Forest Service employees who have field inspection and/or administration responsibilities document and immediately report visual observations of water quality degradation. The only incident reported in FY 2001 was an overburden failure that occurred during road maintenance activities on Mitkof Island Road 6209. The resulting landslide debris blocked Twin Creek just upstream of an anadromous fish barrier. ADF&G and Forest Service specialists inspected the site and both AD&G and ADEC personnel were consulted to determine the best corrective actions. The landslide material was promptly seeded and will be evaluated this spring for additional seeding needs. Some silt fencing was installed but subsequently failed. Smaller limbs were removed from the debris jam, but it was decide to leave the larger material in the stream and evaluate the need for further action this spring. The landslide occurred in early August, during a relatively rainless period, and probably could not have been anticipated from either site or weather conditions. The causative factors for this incident are unclear and no BMP modifications appear to be necessary as a direct result.

Stream Protection Measures at Road Crossings

Results of FY 2000 interagency IDT review of culvert replacement and maintenance projects (to improve fish passage) were discussed in the FY 2000 report, and FY 2001 responses are included in the Appendix.

SUBSISTENCE

Goal: Provide for, "...the continuation of the opportunity for subsistence uses by rural residents of Alaska..." (Public Law 96-487—DEC. 2, 1980, Sec.801)

Objectives: Evaluate and consider the needs of subsistence users in making project land management decisions.

Implement the subsistence monitoring report template that was developed last fiscal year. The template was designed to organize and display monitoring information in order to facilitate an in-depth description of the effects of management activities on subsistence users.

Background: The Alaska National Interest Lands Conservation Act (ANILCA, 1980) requires a priority for subsistence uses by rural residents on Federal public land in Alaska (Title VIII). Since 1990, the Federal Government has been managing resources for subsistence use on Federal public lands through the Federal Subsistence Board.

Several pieces of legislation and sets of regulations provide the framework of our legal responsibilities. These are:

- Title VIII of ANILCA;
- Federal Subsistence Management Regulations (36 CFR 242 or 50 CFR 100);
- Federal Advisory Committee Act (FACA); and
- Federal Advisory Committee Management Regulations (41 CFR 101-6).

Current Situation: In 1995, the Ninth Circuit Court of Appeals ruled that the existing scope of the subsistence program should be expanded to include"...those navigable waters in which the United States has an interest by the virtue of the reserved water rights doctrine." Subsistence management of these waters became effective in October 1999.

To date, this new responsibility has resulted in the development of investigative projects designed to evaluate the condition of fish stocks important to subsistence fisheries, gather and evaluate Traditional Ecological Knowledge (TEK) in several key subsistence areas, and evaluate the consistency of the various existing fish harvest regulations. In addition to working through another annual cycle of wildlife regulation proposals, the first cycle of subsistence fishing regulation proposals were evaluated and presented to the Southeast Regional Advisory Council.

Subsistence Question: Are the effects of management activities on subsistence users in rural Southeast Alaska communities consistent with those estimates in the Forest Plan?

Monitoring Results

The known effects of management activities on subsistence users (rural residents as defined in ANILCA) have not been determined to be inconsistent with the Forest Plan.

Many of the monitoring projects are long term in nature, and conclusions will not be available for several more years.

The following is the Subsistence Monitoring Report template that has been designed to organize and display monitoring information in order to facilitate an in-depth description of the effects of management activities on subsistence users.

SUBSISTENCE MONITORING REPORT TEMPLATE

- Communications, Consultations, and Contacts.

Scoping/Collaborative Stewardship summary.

1. NEPA Scoping – Subsistence portions.
   Numerous NEPA documents were signed in FY 2001. For each of these projects, the effects on subsistence resources were analyzed and a subsistence determination was made. These projects ranged in complexity from environmental impact statements (EIS) on major timber sales to Decision Memos for small scale Special Use Permitted projects.

2. Communications with community leaders regarding subsistence issues.
   Currently we have no standardized way of keeping track of communications with community leaders and Federally recognized Tribes concerning subsistence matters. Because of this, it is hard to differentiate between contacts made with community leaders and recognized Tribes. For this reason, the discussions for item number 2 and 3 are combined under number 3.

3. Consultations with federally recognized Tribes regarding subsistence issues.
   Consultations with Tribes and communications with community leaders took place in many forms. These included informal meetings, informal public open houses, formal 810 hearings, national Roadless Area meetings, Fish and Game Advisory Board meetings, other organized group board meetings, and teleconferences.

4. Efforts to capture traditional environmental knowledge, such as Dog Point Camp.
   Several traditional environmental knowledge (TEK) projects were continued , with additional new projects.

5. Comments from Native and non-Native groups regarding subsistence issues.
   Issues that where brought out during scoping efforts include maintaining road access to subsistence resources, concern over population health of fish and wildlife stocks, and competition for natural resources between rural and non-rural harvesters.

Timber Management

Timber Management Question 1: Are timber harvest activities adhering to applicable timber management standards and guidelines?

Goal: Maintain and protect multiple use values and resources in harvest areas.

Objective: Determine whether standards and guidelines are being followed in harvest areas.

Monitoring Question: Are timber harvest activities adhering to applicable timber management standards and guidelines?

Timber Management Question 1 addresses the limitation of created openings greater than 100 acres and the 1,000-foot beach and estuary buffer requirement. All harvest unit locations are entered in the Forest's geographic information system (GIS). These units are compared to the 1,000-foot beach and estuary buffers to determine if they infringe on the buffer zones. In addition, unit size is tracked (see Timber Management Question 6).

Refer to the Fish Habitat, Karst and Caves, Soil and Water, Wetlands, and Transportation sections in this report for a discussion of harvest as related to standards and guidelines for those resources.

Monitoring Results

There were 2,026 acres fully or partially harvested during FY 2001. Of these, 930 acres resulted in the creation of an opening. The majority of the harvests accomplished, a total of 624 acres, were sold under the 1979 TLMP. The 100-acre size limitation applies to all harvest units. No created openings exceeded 100 acres in size.

There were no stands harvested during FY 2001 that fell within the 1,000-foot beach and estuary zone.

Evaluation of Results

No action is needed. The timber harvest activities discussed above are adhering to applicable timber management standards and guidelines.

Timber Management Question 2: Are harvested forested lands restocked within five years following harvest?

Goal: Forest productivity is to be maintained in all harvest areas. Monitor the restocking of all lands that have received a regeneration harvest and determine if restocking has occurred within five years of final harvest.

Objective: Areas not adequately restocked with desirable tree cover within a five-year time frame are to be identified and action taken to see that failed areas are reforested. Changes in silvicultural practices may be necessary in these areas.

Background: Obtaining regeneration that meets the stocking guidelines and certification standards identified in the Silvicultural Practices Handbook (FSH 2409.17) is rarely a problem on stands receiving a regeneration harvest on the Tongass National Forest. Unpublished research and field observations indicate there are specific site conditions and opportunities that may indicate a need for artificial regeneration (this is usually planting and only rarely artificial seeding). Some situations to be particularly aware of are as follows:

- alluvial sites;
- cutover, open canopy, or sparsely stocked sites with an established ground cover of dense vegetation such as salmonberry, devils club, or grass;
- sites lacking a satisfactory seed source within approximately 660 feet from the center of the cutting unit;
- sites with lower productivity that presently have a plurality of cedar and in which there is a desire to retain a cedar component in the stand;
- stand compositions where change is needed, such as stands planned for harvest or already harvested where the adjacent seed source contains a high incidence of fluted hemlock;
- artificial regeneration is rarely needed and is prescribed on less than 5 percent of the harvested acres; and
- stands needing reforestation for other considerations, such as visually sensitive areas in which immediate regeneration through artificial reforestation would lessen the visual impact; or using genetically improved stock to increase the genetic makeup of the treated stand.

All harvested lands are examined following treatment. Artificially seeded or planted areas are examined one and three years after treatment. Examination occurs three growing seasons after treatment in areas where it is anticipated that natural regeneration will be adequate. Stands are certified as stocked if the third growing season survey indicates that the areas meet stocking standards. Artificial regeneration is prescribed if the third-year survey indicates that natural regeneration is highly unlikely. A silviculturist recommends Regeneration Certification for every unit harvested that meets or exceeds the stocking guidelines in the Silvicultural Practices Handbook - FSH 2409.17. Certification records are reported through the District Ranger to the Forest Supervisor. Certification records are kept in stand files at the ranger districts and in the Silvicultural Information System (SIS), an electronic database.

During FY 2001, 4,551 acres were examined to determine the condition of the regeneration in harvest areas. Based on SIS data, timber harvest that occurred in FY 1996 was evaluated, as displayed in Table 2-27. All lands harvested prior to 1996 are re-stocked.

Monitoring Results

<u>1996 Harvests</u>

All stands harvested in 1996 were certified as restocked with the exception of one stand on the Thorne Bay Ranger District. Stand 104, a nine-acre stand in Compartment 59401, was on National Forest land when harvested in 1995. The area in which the stand is located was subsequently conveyed to other ownership. Figures displayed in the table above for Thorne Bay District reflect the conveyance and nine-acre reduction.

Table 2-27. Status of Reforestation After Final Harvest FY 1996

Tongass Unit	Final Harvest Reported in FY 1995	Adequately Stocked Acres	% Adequately Stocked Acres	Acres Not Adequately Stocked	% Not Adequately Stocked
Petersburg RD	91	91	100	0	0
Wrangell RD	579	525	91	54	9
Sitka RD	431	431	100	0	0
Hoonah RD	14	14	100	0	0
Craig RD	341	2	100	2	1
Ketchikan-Misty RD	2371	2371	100	0	0
Thorne Bay RD	723	723	100	0	0
Total	**4550**	**0**	**100**	**56**	**1**

Evaluation of Results

The results show that 1 percent or 56 acres of forestland harvested in 1996 were not adequately restocked within five years. Fifty-four acres are located on the Wrangell District in two stands. These stands were planted in 1999 and are scheduled to be field checked in 2002. Certification is expected following the field review. The remaining two acres are on the Craig District in one stand. This stand was planted during 2001 and will be surveyed in 2002 and again in 2004, when certification is expected.

In addition to the 56 acres described above and additional 15 acres on Craig District may or may not be adequately re-stocked. These acres are in compartment 63301 stand 1501 and compartment 63401 stand 1504. They were conveyed to the State of Alaska before scheduled stocking surveys were completed.

Timber Management Question 3: Is the Allowable Sale Quantity (ASQ) consistent with resource information and programmed harvest?

The Tongass National Forest operated during fiscal years 1998 and 1999 under the May 1997 Forest Plan ROD. The 1997-ROD set the allowable sale quantity (ASQ) at 267 million board feet (MMBF) per year. The April 1999 Modified Forest Plan ROD revised the ASQ to 187 MMBF per year. The transition to the lower ASQ was established in the 1999 Modified Forest Plan to be implemented beginning October 1, 1999, the start of FY 2000 (Forest Plan ROD, April 1999, Section VII. Implementation, pgs. 63, 64).

During continued litigation of the 1997 Forest Plan decision, Judge James K. Singleton of the United States District Court for the District of Alaska issued a ruling on March 30, 2001 that vacated the 1999 Modified Forest Plan Record of Decision. The court ruling returned the Tongass National Forest to the 1997 Forest Plan decision and, as stated above, set the Forest ASQ at 267 MMBF per year. The court-issued order was effective immediately.

The ASQ is an upper ceiling governing the amount of timber that may be sold over a decade. The amount of sold timber may vary year to year but must not exceed the decadal ceiling. Timber is considered sold when the contract is awarded to the high bidder. Table 2-28 displays the amount of timber sold during fiscal years 1997 through 2001, and compares the total to the average annual amount of the ASQ.

Table 2-28. Tongass National Forest Timber Sold By Fiscal Year

Fiscal Year	Timber Volume Sold (Percent of ASQ)	Average Annual ASQ (1997 and 1999 Forest Plan ROD)
1997	111 MMBF (42% of ASQ)	267 MMBF
1998	24 MMBF (9% of ASQ)	267 MMBF
1999	61 MMBF* (23% of ASQ)	267 MMBF
2000	170 MMBF** (91% of ASQ)	187 MMBF***
2001	67.9 MMBF (25% of ASQ)	267 MMBF****
Average	**86.8 MMBF**	

* This figure does not include timber sales that were advertised and had bid openings in FY 1999 but were awarded in FY 2000.
** This figure includes sales advertised and had bid openings in FY 1999 but were awarded in FY 2000. This was due to financial review of a purchaser prior to timber sale award.
*** Note the change in ASQ due to the transition and implementation of the Record of Decision for the 1999 Modified Forest Plan.
**** Note the change back to the 1997 ASQ level as per the ruling in Sierra Club et al. v. James Lyons et al., March 30, 2001.

The measure of the ASQ is the timber volume sold, not the amount advertised or harvested per year. Timber sales sold during one year are typically harvested over several years. Included in Table 2-29 are harvest totals for the Tongass National Forest for fiscal years 1990 through 2001 for comparison purposes only.

Table 2-29. Tongass National Forest Timber Harvest By Fiscal Year

Fiscal Year	Harvest Total (Million Board Feet)	Forest Plan Allowable Sale Quantity	Percent of ASQ Harvested*
1990	471	450	1.05
1991	363	450	81
1992	370	450	82
1993	325	450	72
1994	276	450	61
1995	221	450	49
1996	120	450	27
1997	107	267	40
1998	112	267	42
1999	146	267	55
2000	147	187	79
2001	48	267	18
4 Year Average (since Forest Plan Revision in 1997)	113		

*Shown for illustrative purposes only; the measure of the ASQ is based on timber harvest volume "sold" on a decadal average basis.

Alaska Judge James K. Singleton issued an injunction in the 1997 Forest Plan litigation of *Sierra Club et al. v. James R. Lyons et al.* on March 30, 2001 halting all activities that would change the wilderness character of any roadless lands. The Forest Service ordered all commercial logging and road construction to stop in any area that could be classified as a roadless area. The Forest Service suspended all timber sale activities that could change the wilderness character even if the Forest Plan permitted commercial harvest by land use designation and prescription. The impacts of this decision reduced timber sale offerings and postponed timber sale planning until Judge Singleton lifted the injunction on May 23, 2001.

In FY 2001, a total of 67.9 MMBF was offered from 57 sales or permits; all but 1.2 MMBF of the timber volume offered in that year received bids. One large timber sale, Skipping Cow, received two bids. A financial capability review was conducted on the high bidder. The financial review concluded a negative finding of purchaser financial responsibility. The sale was offered to the second bidder at the high bidder's price, but the second bidder did not accept the sale. We plan to offer this sale at a later date.

The timber tables display that current timber harvest and timber sold levels are not at or near the 1997 and/or the 1999 Forest Plan ASQ ceilings (Tables 2-30 through 2-32). The effects of timber harvest are below the amount analyzed in the 1997 Forest Plan FEIS and/or the 1997 and 1999 Forest Plan Record of Decision. Therefore, with implementation of land use designation prescriptions, Forest Plan standards and guidelines, and Best Management Practices, the ASQ is consistent with resource information and programmed timber harvest.

Evaluation of Results

No action necessary at this time.

Timber Management Question 4: Are the Non-Interchangeable Components (NIC) of the allowable sale quantity (ASQ) consistent with actual harvest?

The ASQ consists of two separate non-interchangeable components (NIC), also referred to as economic components. Under the 1997 Forest Plan, the ASQ is divided into NIC I (set at 2.2 billion board feet of timber per decade) and NIC II (set at .47 billion board feet per decade). The economic components of the ASQ equate to an average of 220 million board feet NIC I and 47 million board feet NIC II per year.

The Forest Plan sets the proportional mix of timber harvest volume for the NIC I and NIC II categories. The proportional mix in the Forest Plan is set at approximately 80 percent NIC I and 20 percent NIC II (Forest Plan ROD, pg 8). This represents a higher reliance on the NIC II component than that found in the 1979 TLMP.

The purpose of partitioning the ASQ into two separate components is to maintain the economic sustainability of the timber resource by preventing over-harvest of the most economic timber stands. The partitioning of the ASQ also serves to identify that portion of the timber supply that is at risk of attainment because of marginal economic conditions. The NIC I component includes land that can be harvested using normal economic logging systems (normal being defined as standard logging systems such as shovel and short span cable). The NIC II component includes land with high logging costs that are typically economically or technologically marginal. The NIC II component includes difficult and isolated operable timber stands requiring special logging equipment requirements due to yarding distances or topography (such as the use of long-span cable, helicopter or multi-span cable).

Theoretically, the NIC II component of the ASQ would only be offered for sale after the NIC I component had been satisfied. The sale of timber from NIC II lands would most likely be offered when the commodity market for timber is relatively high and the higher operational costs could be covered by the fiber value. Realistically, this is not the only case and the Forest Service typically offers some portion of NIC II with the total timber sale package. There are a variety of reasons for the inclusion of NIC II lands in timber sales including silvicultural treatments, economics of mobilization and the development of alternatives in environmental assessments that address public issues.

Monitoring Results

All timber sale harvest units that were completed during FY 2001 were categorized into non-interchangeable components (NIC). Total timber volume harvested on the Tongass in FY 2001 was approximately 48 million board feet.

Table 2-30. Comparison of NIC I and NIC II Harvest By Fiscal Year, Based on Percent of Total Harvest

Fiscal Year	NIC I Percent of Harvest	NIC II Percent of Harvest
1997*	No Data Collected	No Data Collected
1998	95 % (estimated)	5 % (estimated)
1999	88 %	12 %
2000	77 %	23 %
2001	46 %	54 %

*The 1997 Forest Plan Monitoring and Evaluation Report did not analyze the NIC I and NIC II timber harvest categories.

The Forest Plan ROD states that the ratio of the NIC I and NIC II mix is approximately 80 percent NIC I and 20 percent NIC II (Final EIS, Table 3-81, page 3-282; and 1997 ROD page 8). The mix of NIC I and NIC II for FY 2001 as displayed in Table 2-30 is 46 percent NIC I and 54 percent NIC II.

On March 30, 2001, United States District Court, District of Alaska, Judge James K. Singleton issued an injunction in the 1997 Forest Pan litigation Sierra Club et al. v. James R. Lyons et al., halting all activities on the Tongass National Forest that would change the wilderness character of any roadless lands. The results of the injunction severely curtailed timber harvest operations on the Tongass National Forest. March is the critical month of the year for timber purchasers to plan their logging operations, hire employees, subcontractors, plan mobilization activities and submit their annual operating plans to the Forest Service for approval. The Forest Service suspended harvest activities on all timber sales except those sales that were obviously along existing forest roads (in roaded areas as depicted on the 1996 Forest Plan Roadless Area Inventory map).

The injunction was suspended, pending further order of the court, on May 23, 2001. The Forest Service then notified timber purchasers the activity suspension was lifted and that timber sale operations could proceed on all timber sales. The two-month logging suspension had pronounced effects on the annual timber harvest operations, as displayed in the volume harvested in 2001 (48 MMBF). During the

injunction period, timber purchasers had to direct efforts to their timber sales located in roaded portions of the forest. In general, timber purchasers could not anticipate injunction relief, which bound them to operation decisions made during the suspension. The effects on the amount of NIC II lands harvested is misleading due to the truncated logging season, depressed timber market and skewed results from the choice of sales harvested during and after the injunction. It could be reasoned that the truncated logging season and directing efforts toward sales in roaded portions of the Forest would produce higher harvests in NIC I lands but this was not the case. One timber sale in particular that was 100 percent helicopter harvested skewed the results of the NIC proportion. The Kuakan Timber Sale located on Deer Island was harvested before and after the injunction and represents 72 percent of all helicopter and approximately 25 percent of all volume harvested on the Tongass National Forest for FY 2001. This sale was being operated prior to the Judge Singleton injunction and subsequent logging suspension on roadless portions of the Forest. When the injunction was lifted, operations on the Kuakan Sale resumed and were completed during the remaining field season. This sale was probably harvested because of the wood quality, cost of camp barge mobilization and the needs of the purchaser's milling operations.

The NIC monitoring results for FY 2001 seem to be an anomaly, and misrepresent the actual proportion of NIC I and NIC II harvested in a "normal operating year." NIC data has been monitored for three years (and estimated one year). An apparent upward increase is occurring in the proportion of the NIC II land harvest component (see tables). The actual increase is not certain due to the relatively small data population. A significant proportion of timber sales analyzed in past NIC component monitoring were approved prior to the 1997 Forest Plan ROD. The significance of NEPA approval date is an indicator of the amount of silvicultural systems planned and implemented. NEPA documents signed prior to the 1997 Forest Plan decision have more typical even-aged silvicultural systems. The timber sales in this analysis are those harvest units completed during the 2001 fiscal year. Approximately 46 percent of the harvest units completed in 2001 are from NEPA documents approved prior to 1997 (based on acres harvested). Since a large amount of post-1997 Forest Plan NEPA documents retain more structure (for example implementing goshawk and marten structure retention standards), it is suggested that logging costs are increasing, potentially creating more harvest on NIC II lands. Tables 2-31 and 2-32 display the amount and percentage of silvicultural systems post-1997 Forest Plan decision and for FY 2001.

Table 2-31. Timber Harvest by Silvicultural System for Fiscal Year 2001

Description	Silv. system	Acres	Percent
Clearcut	even-aged	930	46
Selection	uneven-aged	863	42
Two-aged	Two-aged	157	8
Salvage	intermediate	76	4
Total		2,026	

Table 2-32. Timber Harvest by Silvicultural System Under the 1997 ROD (FY 1997-2001)

Description	Silv. system	Acres	Percent
Clearcut	even-aged	14,778	80
Selection	uneven-aged	2,319	13
Two-aged	two-aged	883	5
Salvage	intermediate	361	2
Total		18,341	

The silvicultural systems other than even-aged clearcutting is prescribed for objectives other than timber production, such as meeting visual quality objectives and leaving structure for wildlife. The tables above are listed to display the trend away from even-aged clearcut silvicultural systems. Several broad categories have been formed to roughly estimate why there is an increase observed in the helicopter logging system category. There are several reasons why the NIC II component could be trending upward:

- The increased use of helicopter logging to access hard-to-road, unstable soil/steep topography areas;
- The increased use of helicopter logging to meet scenic quality objectives; and
- The increased use of helicopter logging to meet the general objective of using less clearcut timber harvest prescriptions.

We are uncertain at this time that the non-interchangeable components of the allowable sale quantity are inconsistent with actual harvest. The uncertainty is due in part to the limited number of years of data and the anomaly of FY 2001 given the Forest Plan litigation and court ordered injunction.

Evaluation of Results

No action is necessary at this time. Continue to monitor the trend of harvest from NIC II lands.

Timber Management Question 5: Is the proportional mix of volume in NIC I and NIC II accurate, as estimated in the Forest Plan?

The 1997 Forest Plan set the ASQ ceiling at 2.67 billion board feet per decade, equivalent to an annual average of 267 million board feet per year. The two separate components were proportioned at 2.2 billion board feet of NIC I and 0.47 billion board feet of NIC II per decade or 220 MMBF NIC I and 47 MMBF of NIC II per year.

The non-interchangeable components (NIC) are based on logging operability. Operability refers to the operating attributes and characteristics of a logging system. Operability is used to determine the logging systems requirements necessary to harvest different areas of suitable timber lands. Logging systems are selected based on resource protection needs, access limitations, and economics. The information used in the Forest Plan to estimate and set the proportional mix of components was derived from the forest logging operability inventory. All normal operability lands provide the NIC I portion of the ASQ, and the difficult and isolated lands make up the NIC II portion. NIC I operability refers to logging systems and suitable timberland geography that have normally been accessed on the Forest (such as close distances to a road and logging systems such as tractor, cable). NIC II operability refers to those logging systems and that geography that have not been commonly used or harvested (such as areas referred to as difficult, or isolated to harvest and those systems such as long-span cable and helicopter).

Monitoring Results

The non-interchangeable components (NIC I and NIC II) of the timber cutting areas harvested during FY 2001 were compared to the Forest Plan Operability GIS layer for each NIC category. Table 2-33 displays the results of that comparison. The NIC components for the planned and implemented FY 2000 are displayed for comparison purposes.

Table 2-33. Comparison of the Proportional 2001 Harvest of NIC I and NIC II Using Forest Plan GIS Data to Actual Implemented Harvest Units

	NIC I	NIC II
Forest Plan Planned	48%	52%
Implemented in FY 2001	46%	54%
Forest Plan Planned	82%	18%
Implemented in FY 2000	77%	23%

The information displayed in Table 2-33 indicates that the comparison of planned harvest (projected in the Forest Plan) and that implemented on the ground by logging system is very close. A difference of plus or minus five percent is within acceptable limitations of the data and indicates that the operability information used in the Forest Plan was adequate for estimating the NIC I and NIC II components of the allowable sale quantity.

Evaluation of Results

No action is necessary at this time; continue to monitor the proportional mix of harvest from NIC II category lands.

Timber Management Question 6: Should maximum size limits for harvested areas be continued?

Goal: Maintain multiple-use values as effected by opening size.

Objective: Determine whether or not a recommendation to change the maximum harvest opening size should be made. Monitor the multiple-use effects of harvest opening size on the Forest.

Background: The 1976 National Forest Management Act (NFMA) regulations established 100 acres as the maximum size for created openings using the even-aged system (clearcutting, seed tree, and shelterwood) within the western-hemlock, Sitka spruce forest type of coastal Alaska. The Forest Supervisor, under certain conditions, can approve created openings of up to 150 acres. The Regional Forester can approve openings up to 200 acres. Factors to consider, when approving openings greater then 100 acres, are provided in the Forest Plan's Forest-wide standards and guidelines for the timber resource. There appears to be no need to pursue change in the maximum opening size or the factors for approving openings greater than 100 acres.

Monitoring Results

During FY 2001, 65 harvest areas (timber stands) were delineated in the Forest's geographic information system (GIS), with corresponding records created in the Forest's Silviculture Information System (SIS) database. Accounting for adjacency (harvested stands that touch one another, which create a larger opening when added together), 32 harvest areas were logged in FY 2001 that created openings using the even-aged silvicultural system. Table 2-34 displays the frequency of openings created through timber harvest during FY 2001.

Table 2-34. Harvest Unit Frequency by Unit Size

Acreage Range	Number of Openings	Total Number of Acres
1-10	10	46
11-20	5	82
21-30	5	129
31-40	1	38
41-50	3	124
51-60	4	224
61-70	2	134
71-80	1	71
81-90	1	82
Totals	32	930

Evaluation of Results

No created openings exceeded 100 acres in size. The 32 openings averaged 29 acres, and ranged from 2 to 82 acres in size. Trends in harvest opening size have been toward smaller openings and less reliance on the even-aged silvicultural system. Forest Plan standards and guidelines for scenery and sensitive species such as Northern goshawk and American marten, and soil and water BMPs emphasize smaller sizes. Also, emphasis on leaving old-growth structure in harvest areas is resulting in smaller harvest openings.

In addition to the 32 units discussed above, 39 units were harvested using either uneven-aged or two-aged systems or were salvage harvested. Totaling 1,096 acres, these harvest units ranged in size from 1 acre to 136 acres. The system name is based on the number of age classes present after the initial harvest, such as even-aged, two-aged, and uneven-aged. Even-aged systems produce stands that consist of trees of the same or nearly the same age. Two-aged stands result from treatments which leave behind a substantial portion of the original stand structure in the form of large trees distributed or clumped throughout the stand area. The remnant trees left on the site represent one age class, and the newly established trees represent another age class. Finally, uneven-aged systems create stands that include three or more distinctly different age classes by using individual or group selection methods.

Transportation

Goal: Develop and manage roads and utility systems to support resource management; recognize the potential for future development of major transportation and utility systems.

Objectives: Provide access for Forest users and support Forest resource management activities. Manage and maintain roads to protect water, soil, fish, and wildlife resources.

Transportation Question: Are the standards and guidelines used for forest development roads and log transfer facilities effective in limiting the environmental effects to anticipated levels?

Access and Travel Management

The Forest Plan Monitoring and Evaluation Guidebook (May 1999 draft) directs that gates and barriers on closed roads should be visually inspected for integrity and evidence of being bypassed. In FY 2001, information was collected on the existence and effectiveness of roadway features installed to block access to low clearance highway vehicles on all roads surveyed under the Region 10 Road Condition Survey Protocols.

Two types of forest roads were inventoried and analyzed: classified, or permanent roads that are needed for long-term motor vehicle access, but may be periodically closed (placed in storage), and temporary roads, which are not intended for long-term motor vehicle access and are to be closed (decommissioned) after their intended use is complete.

The data presented below is not intended to represent conditions across the Tongass National Forest. It is simply a listing of the blockage features and their effectiveness found in the FY 2001 surveys and collected for this year. Data from surveys in the late 1990s were collected using different protocols. As the rest of the road systems are surveyed using the new protocols, a more complete picture of the effectiveness of road blockage features will be available.

Monitoring Results

<u>Classified Roads</u>

Classified roads are intended for long-term use. During times of inactivity they may be closed to motorized traffic, and placed into a storage capacity. While open to vehicle traffic they may not be suited for low clearance highway vehicles due to the addition of drive-through water bars that are installed to assist in surface water runoff during storms. These roads are suitable for high clearance vehicles such as 4-wheel drive pickup trucks.

Fifty-six individual classified roads with closure devices were visited during surveys performed in FY 2001. The closure device most often encountered was the pit and mound or water bars located near the beginning of the road. Thirty classified roads had pit and mounds or water bars near the beginning of the road; 14 of these were impassable to all vehicles, 15 showed evidence of occasional use by non-highway vehicles such as motorcycles and ATV's, and one showed evidence of use by highway vehicles.

The next most frequent closure device encountered on classified roads was a vegetative cover (23 classified roads). The trees and brush were allowed to grow and closed the roadway through a natural process. These roads typically had pits and mounds also, but the vegetative growth effectively blocked highway vehicles before reaching them. More than half of the roads blocked by vegetative growth (14 classified roads) showed evidence of occasional use by non-highway vehicles.

During FY 2001, three gates were encountered on classified roads; two of these were open, while the third was closed, effectively blocking traffic.

<u>Temporary Roads</u>

Temporary roads are intended for short-term use. The most common temporary road on the forest is one that leads to a landing within a harvest unit authorized by a timber sale contract; others may be access roads to a mine or mineral extraction area authorized by permit or lease; and others may provide

temporary access to power transmission corridors by permit. Once the contract, permit, or lease is terminated, temporary roads are stabilized by removing drainage structures, adding water bars, constructing pits and mounds of rock material to block further highway vehicle traffic, and returning the roadway back into vegetative production.

Over 500 former temporary roads were inventoried during FY 2001. Road blockage features most often encountered were pits and mounds as well as water bars near the beginnings of each road (233 former temporary roads). Four of these roads showed evidence of continued use by highway vehicles, while 79 showed occasional use by non-highway vehicles such as motorcycles and ATV's. The next most frequent blockage feature encountered was a vegetative closure at the beginning of the road (198 former temporary roads). Alder and brush that naturally encroached the roadbed closed these roads. These roads typically had pits and mounds also, but the vegetative growth effectively blocked highway vehicles before reaching them. Many of these roads are blocked by alder and brush (78 former temporary roads) showed evidence of occasional use by non-highway vehicles. Of the 500 former temporary roads inventoried, 58 had no effective feature installed to block access to highway vehicles. Since these roads were not decommissioned after their intended use, they are considered unclassified roads.

Evaluation of Results

The monitoring results indicated that pits and mounds/ water bars are effective roadway features when used to block access to highway vehicles on classified roads. Blocking highway vehicles on classified roads was effective at 97 percent of the sites. While 47 percent of the sites showed evidence of occasional use by non-highway vehicles such as motorcycles and ATV's, this incidental use represents the growing popularity of ATV's for both recreation and resource-oriented fieldwork. Growth of alder and brush on classified roads was effective in blocking access to highway vehicles on classified roads in all cases encountered, but non-highway vehicles continued to use 61 percent of these roads. Vegetative blockages were commonly used on classified roads in the past. Because it is not as effective as the pit and mound / water bar, recent road storage projects have relied almost exclusively on pits and mounds since the results are immediate, and not dependent on the growth rate of vegetation.

On former temporary roads, pits and mounds/ water bars were also an effective blockage feature to highway vehicles, blocking access on 98 percent of the roads where this feature was the first blockage encountered, but still allowing access to non-highway vehicles on 34 percent of the roads. Where vegetative growth was established across the roadway blocking access to highway vehicles, non-highway vehicles occasionally continued to use 39 percent of the roads. Continued use of these short-term roads by any wheeled vehicles was not planned and not permitted, therefore more effective closure methods than the traditional pit and mound/ water bars or vegetation cover will be necessary to deter traffic may be necessary to expedite the process of returning these roadway areas to their original forested state. More success in blocking traffic at these sites can be gained by excavating deeper trenches, constructing higher and more irregularly shaped mounds, and blocking ATV traffic from circumventing the blockages in roadside ditches.

Stream Turbidity

Monitoring of stream turbidity during in-stream activity involves a simple, low-cost observation of a water quality standard responding to routine effectiveness monitoring commitments in the USDA Forest Service Memorandum of Understanding with the Alaska Department of Environmental Conservation (1992).

The basis of the turbidity sampling procedure is to determine if Best Management Practices are effective in preventing water quality degradation (using turbidity as the sole parameter of water quality). According to the Alaska Forest Resources and Practices Regulations (11AAC95), "degradation of water quality" means a decrease in water quality such that the affected waters are unable to fully maintain existing or designated uses, but does not include decreases in water quality that are temporary, localized, and reparable. 11AAC95 defines "temporary" as 48 hours or less and "reparable" as an effect that is reversible by natural processes, such that the designated use will return to a state functionally identical to the original.

Details on the turbidity monitoring are included in Soils and Water Question #4, "Are Best Management Practices effective in meeting water quality standards?"

Log Transfer Facilities

Monitoring will continue to be conducted for each log transfer facility (LTF) under terms of the LTF permits, in accordance with Alaska water quality standards and requirements from the Environmental Protection Agency for non-point source discharge. LTF monitoring for this report was accomplished through field inspection and documented through completion of a Log Transfer Facility Monitoring Table. Table 2-35 is designed to tabulate assessments made of the success of the Best Management Practices stipulated as terms of the LTF permits. The assessment elements of the LTF Monitoring table include the following:

Site Identification: Common Name; Corps of Engineer Permit Name, NPDES 402 Permit.

Transfer Activity: Facility Transfer Type; Activity Status; Current year volume.

Fuel Control: Visible Oil Sheen per LTF guidelines M5 of Forest Plan (Alaska Timber Taskforce Guidelines); Discharge Reported to Alaska Department of Environmental Conservation (ADEC) under requirements of Alaska Administrative Code (18 AAC 75.300-307); Discharge Reported to National Response Center (NRC) under requirements of the Clean Water Act (40 CFR 110,117, and 302).

Runoff Control: Reference BMP 14.27 - Drain to Sediment Trap; Vegetated Filter Strip.

Bark and Debris: Reference BMP 14.27 Excessive Churning Prevented; Remove Debris & Bark from LTF/yard; Bark & Debris Properly Disposed; Marine Bark Zone of Deposit; Date Last Dive.

Monitoring Results

Two general types of monitoring occur: upland and marine. The upland monitoring is summarized into assessments developed by Forest Service timber sale administrators, and is recorded under the general categories of "Fuel Control," "Runoff Control," and "Bark and Debris." These assessments were made for all the active sites. Contracted divers performing underwater bark debris surveys accomplish marine monitoring. Refer to appendix for more details on the specific monitoring results.

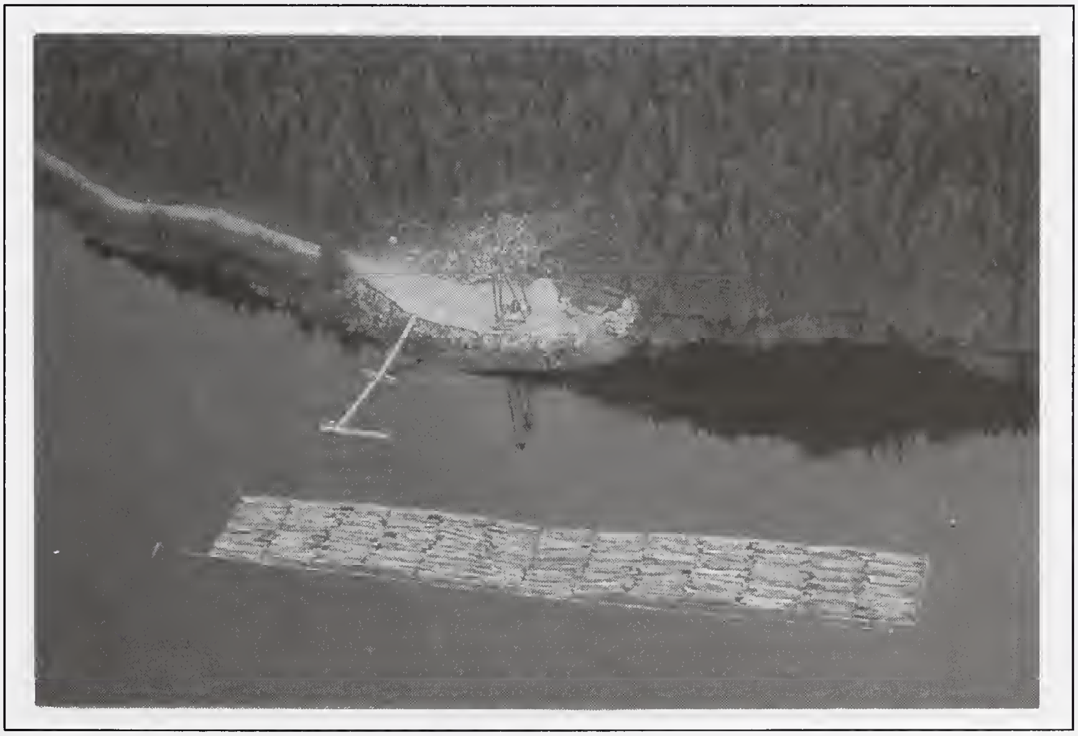
Bark Monitoring and Reporting

Bark monitoring is required annually for each log transfer facility (LTF), under the EPA General NPDES Permit No. AK-G670-1000 and EPA General NPDES Permit No. AK-G70-0000. This monitoring is required at sites that transfer a total volume of 15 mmbf or more during the next five years, and are located in less than 60 feet mean lower low water (MLLW). LTFs classified as Type V or VI log transfer facilities under Part I.B monitoring for bark accumulations are not required. If the annual bark monitoring survey conducted at the beginning of the season indicates continuous coverage by bark and wood debris of 0.9 acre or greater, the next annual bark monitoring survey is conducted after cessation of log transfer, or in the following year prior to any additional log transfer. Otherwise the annual bark monitoring survey is not required during years when the LTF is not operating.

The purpose of the bark monitoring program is to determine compliance with the Alaska water quality standards for settable – residues in marine waters. In accordance with 18 AAC Section 70.210, ADEC has authorized a zone of deposit for facilities authorized to discharge under the general NPDES permit. The zone of deposit may include continuous coverage, discontinuous coverage, and trace coverage by bark and wood debris.

Preliminary bark monitoring dives and pre-discharge bark surveys were conducted at 33 LTFs in 2001. Only three of the LTFs, Thorne Bay, Saginaw Bay, and St. John Baptist, had a continuous coverage of bark and wood debris that exceeded both 1.0 acre and a thickness of 10 centimeters at any point (Table 2-35) in 2001. These sites will be managed in a manner that will not contribute to further bark accumulations until the current bark remediation study has been completed and agreed to by all participating agencies. This approach is intended to result in the development of defined methodologies to bring these sites into compliance with current permit requirements.

The bark monitoring conducted in 2001 was done in accordance with the EPS General NPDES Permit Number AK-G670-1000 and EPA General NPDES Permit Number AK-G70-0000. Prior to these permits, there was no standard protocol for bark monitoring. Copies of the surveys for the bark monitoring sites are available from ADEC.



Oil Sheen Monitoring and Reporting

During periods of log transfer operation, receiving waters at the LTF shall be visually monitored daily for the presence of an oil sheen. The presence of an oil sheen shall be recorded, with the date, name of observer, cause or source of oil sheen, and corrective measures taken, and shall be reported to EPA within 24 hours in accordance with Part IX.B.

Evaluation of Results

In 2001 all active log transfer facilities were operated in accordance with their permits. The cases where fuel/hydraulic fluid spills were a problem were handled as specified in the Spill Prevention Control and Counter Measure Plan (SPCC) anticipated in their operating plans. The actions of the sale administrators, which are prescribed in the standards and guidelines for log transfer facilities, have served to limit the environmental effects of LTF operation to anticipated levels. The guideline for locating LTFs along straits and channels proved to be effective in reducing underwater bark accumulations.

The Daily Oil Sheen Logs proved to be very useful in documenting causes of sheens and corrective actions. The logs are required by stipulation of NPDES permits in some cases and by Forest Service contract in others.

Table 2-35. LTF Bark Monitoring Dives, FY 2001

Site Name	Common Name	Date Dive Completed in 2001	Zone of Deposit Acres
Appleton Cove 4	Appleton Cove LTF	7/11/01	0.1
Behm Canal 43	Hassler LTF	6/13/01	0.1
Carroll Inlet 23	Carroll Inlet LTF	6/08/01	0.5
Chatham Strait 60	Rowan Bay LTF	6/12/01	0.6
Chatham Strait 99 & 77	Kennel Creek/Freshwater Bay	7/08/01	0.1
Clarence Strait 21	Thorne Bay LTF	6/24/01	2.56
Clarence Strait 24	Coffman Cove LTF	6/24/01	0.18
Davidson Inlet 18	Marble Island East LTF	6/26/01	0
Davidson Inlet 8	Port Alice LTF	6/26/01	0
Eastern Passage 12	Venus Cove LTF	6/27/01	0.1
El Capitan Pass 6a	El Capitan LTF	6/25/01	0
Frederick Sound 18	Portage Bay LTF	6/13/01	0.1
Frederick Sound 34	Saginaw Bay LTF	6/12/01	1.7
Icy Strait 6	Homeshore LTF	7/08/01	0
Neets Bay 12	South West Neets Bay LTF	6/13/01	0
Neets Bay 8	Fire Cove LTF	6/13/01	0.24
Peril Strait 14	False Island LTF	7/11/01	0.3
Peril Strait 21	Todd LTF	7/11/01	0
Peril Strait 29	Hanus Bay LTF	7/12/01	0.2
Shakan Strait 7	Calder LTF	6/25/01	0
Sumner Strait 54	Labouchere Bay LTF	6/25/01	0
Sumner Strait 78	Rynda LTF	6/28/01	0
Sumner Strait 81	St. John LTF	6/26/01	0.4
Tenakee Inlet 20	Crab Bay LTF	7/09/01	0
Tenakee Inlet 21	Indian River LTF	7/10/01	0.1
Tenakee Inlet 24	Inbetween LTF	7/09/01	0
Tenakee Inlet 25	Corner Bay LTF	7/10/01	0.6
Tuxekan Pass 6	Naukati LTF	6/26/01	0
Tuxekan Passage 2	Nichin Cove LTF	6/26/01	0
Twelve Mile Arm 1	East Twelve Mile South LTF	7/11/01	0.5
Ulloa Channel 4	Suemez/Refugio LTF	6/27/01	0
Yakutat Bay 6	Sawmill Cove LTF	7/24/01	0
Zimovia Strait 101	King George LTF	6/29/01	0

Wetlands

Goal: Minimize the destruction, loss, or degradation of wetlands and preserve and enhance wetland functions and values.

Objectives: Avoid alteration of or new construction in wetland whenever there is a practicable, environmentally preferred alternative. Implement Best Management Practices and estuary, riparian, and soil and water standards and guidelines specific to wetlands.

Background: Wetland implementation monitoring will follow established protocols for 100 percent BMP implementation monitoring. Additionally, a representative sample of harvest units and associated roads will be monitored annually using an interdisciplinary approach. Avoidance of wetlands will be monitored Tongass-wide each year, through GIS analysis.

Currently, the Tongass National Forest does not have an approved method to evaluate the effectiveness of BMPs related to impacts of management activities on wetland functions and values. Each environmental impact statement completed for projects that contain wetlands includes evaluation and finding for impacts relative to wetlands. Studies exist that are aimed at partially answering functional effectiveness questions. Some of these studies are complete and some are ongoing. No one study gives the answer to all the functional questions associated with management activities in wetlands.

Wetland Question 1: Are Wetlands standards and guidelines being implemented?

Avoidance Implementation Monitoring

The information provided in Table 2-36 was gathered from project implementation of Category 3 and 4 timber sales - those timber sale projects for which the project-level NEPA was done post Forest Plan Revision ROD (Forest Plan ROD, 1997). The activities that took place in 2001 were developed to achieve consistency with the revised Forest Plan.

Table 2-36. Total Acres of Wetlands Harvested and Miles of Road Constructed for the Tongass National ForestManaged in FY 2001

Total Wetland Acres*	Wetland Acres Harvested	% Total	Wetland Acres ** Impacted by Road Construction	% Total
5,709,069	17 ac.	<0.1%	11 ac.	0.1%

* Total acres of mapped land (excluding private lands and some wilderness areas). Data was taken from Tongass Soils GIS layer (CLU, or Common Land Unit), second growth and roads database.
** Based on an average of a 40-foot wide road.

Monitoring Results

Total wetlands impacted by roads were approximately 11 acres. Of the total wetlands on the Forest (mapped wetlands, which exclude some wilderness areas and private lands), this accounts for less than 0.1 percent of the total wetlands.

Total wetlands impacted by harvest units were 17 acres. Timber harvest occurred in the Upper Tuxekan Pass, Lower Tuxekan Pass, Heceta-Sawfly, Salty, and Polka-Pillar timber sales on the Ketchikan and Thorne Bay Ranger Districts. Of the total wetlands on the Forest (excluding some wilderness and private lands), this accounts for less than 0.1 percent of the total wetlands; forested wetlands were mostly impacted by timber harvest. Prescriptions are developed and implemented to minimize impact to wetlands; timber harvest is not restricted on forested wetlands.

With less than 0.1 percent of the total wetlands impacted by road construction and timber harvest, the Tongass National Forest has fulfilled the intent of the standards and guidelines during the year 2001 in avoiding wetlands where practicable. Even with the combined effects of FY98 and FY99, FY00 and FY01 activities on wetlands, the Forest is illustrating avoidance of wetlands in its management activities.

BMP Implementation Monitoring

BMP implementation monitoring for wetlands (BMP 12.5) follows Tongass National Forest Best Management Practices Implementation Monitoring Strategy (June 1998) protocols. Results from that monitoring are reported in the annual BMP Implementation Monitoring Report.

Summary of results in BMP Report taken from 2001 BMP Implementation Monitoring Report

The Best Management Practices (BMPs) for wetland standards and guidelines were monitored on the Tongass through guidelines described in the Tongass Monitoring Strategy. The strategy was developed to provide direction for Tongass Land Management Plan implementation monitoring. The BMPs evaluated are included in the Soil and Water Conservation Handbook (FSH 2509.22, October 1996).

Refer to the 2001 BMP Monitoring Report included in the Appendix for details on how the monitoring was conducted. A summary of the findings for soil and water resources is given below in Tables 2-37 and 2-38.

BMP Monitoring Results

BMP 12.5 – Wetland Protection Measures

The BMP for Wetland Protection Measures was monitored on the 2,855.5 acres monitored through the 100 percent implementation monitoring effort and the 10 percent quality control monitoring. Specifically, 120.42 acres of delineated wetlands identified in timber sale environmental documents were monitored in the 100 percent monitoring effort; 28.92 of these acres were monitored by the 10 percent quality control IDT.

Table 2-37. Summary of BMP Use, Number of Departures and Corrective Actions

BMPs Applied	Number of Times the BMP was Appropriate for Use	Number of Departures from Full BMP Implementation	Number of Times Corrective Action Applied
12.5	37	0	2 (5.4%)

Table 2-38. Summary of BMP Use, Number of Departures and Corrective Actions for FY 2001 monitored by IDT in the 10% quality control sample

BMPs Applied	Number of Times the BMP was Appropriate for Use	Number of Departures from Full BMP Implementation	Number of Times Corrective Action Applied
12.5	14	0	1 (7.4%)

A total of 91 units and 16 roads were monitored this year through the 100-percent implementation monitoring process. Of these units and roads monitored, actually 83 units and 5 roads were in the FY 2001 pool. A subset of the total BMP implementation monitoring pool consisting of 23 units and 13 roads was monitored during the 10 percent IDT monitoring process. This subset of units monitored by the IDT included 15 units and 5 roads from the FY 2001 pool. The tables and statistics discussed reflect results from the total units and roads monitored in the 100 percent and 10 percent IDT monitoring efforts. Results of the 100-percent monitoring of units and roads for BMP 12.5 in FY 2001 concluded that the BMP was fully implemented at all sites.

While reviewing the monitoring forms from the Best Management Practice implementation monitoring, we discovered that areas of wetland had been deleted from some units. This occurred primarily in the situations where units had been laid out with significant inclusions of wetland. Evaluation of the timber, wildlife benefit and wetland characteristics resulted in deletion of these wetland areas. Additional buffers were added or areas of timber were retained in some units to protect wetlands. In units where forested wetland was harvested, partial to full suspension measures were prescribed and implemented. Full suspension was achieved in most of the areas of forested wetland. Specific yarding systems were

designed and utilized under the close supervision of the sale administrator in wetland areas. Very little to no soil disturbance was noted in the harvested wetland areas monitored.

Two corrective actions relative to wetlands are described below. Both actions contributed to fully implement the BMP:

(1) A unit where puncheon was laid in the wetland during unit harvests and then removed. The puncheon minimized damage to the wetland. The sale administrator implemented this action during unit harvest.

(2) A unit where the buffer on a karst wetland was increased during sale administration to further protect the wetland.

Evaluation of Results

The Best Management Practices are being implemented on the Tongass National Forest. The high quality work of the individuals involved with the site investigations, layout, unit design, environmental assessment, and contract administration has contributed to this success. Training on wetland identification and protection conducted on the Tongass as well as communication about wetland protection has increased the knowledge of sale administrators and engineers. The sale administrators actively avoided wetlands and implemented protective prescriptions on wetlands. They deleted wetland areas, and added buffers and retention areas to protect wetlands. The logging systems were specifically designed with prescriptions for wetlands. Continued emphasis needs to be placed on identifying these wetland areas during environmental assessment and layout. In several of the older environmental assessment documents, the wetland areas were not identified on the unit and road cards nor specified by unit in the documents.

Comparing the monitoring results this year to the past three years, the BMP has been consistently implemented successfully. The BMP was applied only 42 percent as many times as last fiscal year. This decrease reflects the significant decrease in the units and acreage harvested. Many of the wetland areas have been deleted from the units prior to layout so this BMP is not used as frequently in the units laid out under the new standards and guidelines. Many of the units were selective cut and partial retention units on steep terrain, where there was less wetland. The harvest prescriptions were developed to minimize impacts to wetlands and these harvest prescriptions have been successfully implemented.

Wetland Question 2: Are Wetland standards and guidelines effective in minimizing the impacts to wetlands and their associated functions and values?

Monitoring Results

During FY 2001, the Forest ecologist initiated the first year of data collection for the wetland classification. The wetland classification was identified last fiscal year to be a critical component to developing effectiveness monitoring protocols. The wetland classification is also part of a larger classification effort initiated under the Existing Vegetation module of the Natural Resource Information System (NRIS).

FY 2001 fieldwork included survey of four major landscapes. Plot samples of wetland plant communities were taken in the areas of Sitka, Petersburg, Hoonah, and Prince of Wales Island. Approximately 188 plots were sampled, primarily on lowland wetland types (elevations less that 1500 feet). Plot data included complete species lists, species composition, soil characterization, and other site data. Plot data were entered electronically into an excel spreadsheet; in FY 2002, this data will be migrated into ACCESS or into the TERRA database, depending on when this system will be available to the Forest. Plot locations for all 188 sites were also entered into the GIS database.

Additional plot sampling will be conducted in FY 2002, focusing efforts on upper elevations and other wetland communities where data gaps are found. Analysis of data gaps will be conducted during fiscal years 2002 and 2003.

Progress on implementing the wetland effectiveness studies discussed in last year's Monitoring and Evaluation report did not move forward during FY 2001 for several reasons: 1) the wetland classification is a necessary precursor to implementing these projects; and 2) personnel were limited in the ecology and watershed departments due to retirement and moves of several employees. While vacancies still exist in these departments, initiation of methodologies from two studies will be a goal for FY 2002. These studies include "The impacts of forestry roads on peatlands within the Tongass National Forest, Southeast Alaska, 1999" and "Effects of forest roads on surface and subsurface flow in Southeast Alaska, 2000."

A direct answer to the wetland effectiveness question is still pending at this time. We will not know if wetland standards and guidelines are effective in minimizing the impacts to wetlands and their associated functions and values until the wetland classification is complete and the studies mentioned above are undertaken.

Evaluation of Results

With less than 0.1 percent of the total wetlands impacted by road construction and timber harvest, the Tongass National Forest has fulfilled the intent of implementation standards and guidelines during the implementation of the Forest Plan in avoiding wetlands where practicable. Even with the combined effects of FY 1998 and FY 1999, FY 2000 and FY 2001 activities on wetlands, the Forest is illustrating avoidance of wetlands in its management activities. Overall, Best Management Practices are being implemented where applicable, according to the 100 percent sampling results by sale administrators and engineering representatives, as well as the spot sampling conducted by the Tongass BMP oversight team. This has been the case for the last 5 years of monitoring. Trends indicate that BMPs are being prescribed site specifically and are being fully implemented.

An evaluation of the wetland effectiveness results is still pending at this time. We will not know if wetland standards and guidelines are effective in minimizing the impacts to wetlands and their associated functions and values until the wetland classification is complete and the studies mentioned above are undertaken. The monitoring protocols have been tested in previous studies; therefore there is a high confidence that they will provide appropriate information regarding the effectiveness of standards and guidelines on several (but not all) functions and values. These protocols will also be incorporated into other riparian and aquatic monitoring, specifically the case study watershed studies. The wetland classification will be a useful tool for not only understanding wetland functions and values, but for many interpretations of forest management on these plant communities.

Wild and Scenic River

Goal: Maintain the outstandingly remarkable values and the free flowing conditions of rivers designated or recommended for designation as components of the National Wild and Scenic Rivers System.

Objectives: Manage all rivers recommended for designation as Wild, Scenic, or Recreational rivers in the Tongass Land and Resource Management Plan to maintain their eligibility pending designation by Congress into the National Wild and Scenic Rivers System.

Background: The Wild and Scenic Rivers Act of 1968 established a policy for preserving selected rivers in a free-flowing condition that would balance the development of water, power, and other resources on rivers of the United States. Rivers are eligible to be considered for inclusion in the National Wild and Scenic Rivers System if they are essentially free flowing (without major dams, diversions, or channel modifications) and if they possess at least one "outstandingly remarkable" scenic, recreational, geologic, fish, wildlife, historic, cultural, or other similar value. These values should be a unique or exceptional representation for the area.

Wild and Scenic River Question 1: Are Wild, Scenic, and Recreational River standards and guidelines being implemented?

The standards and guidelines are being implemented for the free flowing conditions and outstandingly remarkable values for eligible rivers on the Tongass National Forest.

Monitoring activities in 2001 to support these findings include:

1. Monitoring visitor use at several recreation sites within the corridor of seven rivers. The recommended river systems reviewed were Anan Creek, Essowah Lakes and Streams, Hasselborg River, Kegan Lake and Stream, Blue River, King Salmon River and Blind Slough.
2. Monitoring visitor use in a number of locations.
3. Monitoring compliance of a recreation project within the corridor– reconstruction of Man-made Hole Picnic Area.

Monitoring Results

Existing use on the Hasselborg, King Salmon managed by the Juneau Ranger District and Admiralty National Monument appear to be within the allowed standards and guidelines for recreational outstandingly remarkable features and they appear effective in managing the rivers. This is based primarily on anecdotal evidence, reviews of outfitter/guide actual use records and very limited direct monitoring.

A picnic area at Man-made Hole is on the edge of the Blind River corridor on the Petersburg Ranger District. The NEPA planning for the Man-made Hole Picnic Area reconstruction project on Blind River documented compliance with the Recreational River standards and guidelines. Implementation for the reconstruction occurred in the summer of 2001.

Specific visitor data at the recreation sites along Blind River was not collected as consistently during FY2001 as in the past due to lack of personnel. Recreation maintenance crews and campground host volunteers did observe trends, however. As in years past, Blind River Rapids Trail and Blind Slough Picnic Area had high use during times of good weather and strong fish runs. The whole river corridor is inventoried as being Roaded Natural in the Recreation Opportunity Spectrum classification. The guidelines for social encounters in this type of area includes meeting less than 20 other parties per day on trails and in dispersed areas during at least 80 percent of the primary use season. This condition is being met at Blind River Rapids trail area. Blind Slough Picnic Area is considered a developed recreation site where it is acceptable to meet numerous other parties. The guidelines also state that developed sites are often at full capacity but do not exceed 80 percent of the design capacity over the season of operation. This condition is being met at Blind Slough Picnic Area.

Five outfitter/guides are permitted for the Blind River Rapids area. One outfitter/guide is currently permitted to take sightseers to Blind River Rapids trail and other sites along the road system on Mitkof Island. Her permit allows her to guide up to 20 people on the trail at one time. Another outfitter/guide

was also permitted to take large groups to Blind River Rapids trail. The permit stipulated that groups could be no larger than 20 people at one time. If they needed to split the clients into two groups to meet that requirement, then the two groups had to be separated by time and space while on the trail.

The Craig Ranger District has seen no change in the Kegan or Essowah rivers and lakes systems that would indicate effects to the eligibility of these recommended rivers. Only the recreation outstandingly remarkable feature was reported in this monitoring cycle.

The Wrangell Ranger District staffed interpreter positions at the Anan Creek Bear Observatory and monitored the use of almost 2,700 visitors there. Information was collected about the viewing public, outfitter or guide use, and bear behavior. The monitoring of the site shows the recreation use is consistent with what was anticipated in the Anan Management Standards Environmental Assessment completed in 1996. As the 1996 management plan for this area is now dated, and since we now have direction to implement the Tongass Forest Plan based on the 1997 decision, the Wrangell District Ranger anticipates reviewing this decision in 2002.

Evaluation of Results

Standards and guidelines are being implemented, and used to direct management decisions. Eligibility of specific classifications levels recommended in the Forest Plan is being maintained until Congress makes these designations.

Based on two aerial surveys and information collected from local residents with knowledge of the area, the Blue River within the Mist Fiords National Monument receives very little, if any, use. The area is extremely difficult to access and this deters most people who would consider going there. As a result, the Blue River continues to meet all criteria for a wild river designation.

While vehicle numbers at the recreation sites on Blind River on the Petersburg Ranger District were quite high at times, the areas away from established recreation sites had very few visitors. It is difficult to get a good count of the dispersed users who recreate along Blind River. The visitor levels from local use and outfitter/guide use fit the guidelines for Roaded Natural, which is the ROS class for the whole river corridor.

One monitoring project that has not yet been completed due to lack of funds is an airborne video flight of Blind River. This low altitude flight would take video and digital still photos of the whole river corridor. This would be a good baseline tool to use in future years to compare any physical changes taking place in the corridor. This would also be worthwhile on other rivers recommended for designation. But it would be particularly useful on Blind River since it is connected to the city of Petersburg by road and receives a high amount of recreation use. Most of the other recommended rivers on the Petersburg Ranger District are located in very remote areas with little recreation use.

It is important to continue analyzing proposed timber sales for their impacts on the eligibility of recommended rivers.

Wild and Scenic River Question 2: Are Wild, Scenic, and Recreational River standards effective in maintaining or enhancing the free flowing conditions and outstandingly remarkable values at the classification level for which the river was found suitable for designation as part of the National Wild and Scenic River System?

The Recreational River standards are effective in maintaining and enhancing the free flowing conditions and outstandingly remarkable values.

Monitoring Results

The staff at the District offices who reported their monitoring results noted that the standards for maintaining or enhancing the free flowing conditions and outstandingly remarkable values for the rivers is effective.

The outstandingly remarkable value of recreation on Blind River on the Petersburg Ranger District was enhanced in 2000 with two projects: partial construction of a fully accessible loop trail around Man-Made Hole lake, and reconstruction of a short gravel section of the Blind River Rapids trail at the end where the boardwalk ends at the tidal flat. Both of these projects are compatible with the standards and guidelines for Recreational River.

One section of Blind River is closed to motorized vehicles from December 1 to April 1 each year. This closure protects the trumpeter swans that over winter there. A few times in the past there have been snowmobile tracks in the snow indicating non-permitted use in the closed area. This non-permitted use was not noticed in the winter of 2000/01.

The Petersburg Ranger District continued to close the boat ramp at Blind Slough picnic area during the summer months to alleviate the conflict between swimmers and motorized watercraft. It was determined that the ramp could be opened one week earlier to improve access for fishers and it would have minimal impact on swimmers.

Evaluation of Results

The Wrangell Ranger District reported that there were almost 2700 visitors to Anan during the staffed season in 2001. Most visitors came using their own means for transportation and 31percent of the visitors were guided. Of the people visiting, 86 percent were non-local and 14 percent were local visitors.

The Ketchikan-Misty Ranger District reported that there are few, if any, current threats to the Blue Rivers' suitability for designation as a part of the National Wild and Scenic River System.

The Craig Ranger District notes that there has been no changes t the Kegan or Essowah rivers and lakes systems that would indicate effects to the eligibility of these recommended rivers.

Winter recreation activities on Blind River have not been monitored as closely as summer activities because there is no regular maintenance program for the area in the winter. Most information comes sporadically from Forest Service employees who recreate in the area and report back use levels. Ice-skating on Blind River is a very popular activity for Petersburg residents, when the weather conditions allow. Since the ice conditions are usually not suitable for long, the number of people at Blind Slough Picnic Area can be quite high during good conditions. Cross-country skiing and snowmobile use are also popular in the area when snow conditions are appropriate. Since part of the area is closed to snowmobile use in the winter, there is a need to continue monitoring it for compliance. This area is one of the few places in Southeast Alaska where trumpeter swans stay all winter. It is one of the reasons for the high wildlife values in the river corridor.

The proposed state ferry terminal at the southern end of Mitkof Island by 2006 could significantly change recreation use patterns and levels along Blind River. This use will need to be monitored to ensure that the standards and guidelines for a Recreation River are being met and that the outstandingly remarkable values are being maintained.

Wilderness Areas

Goal: Manage designated Wilderness to maintain an enduring wilderness resource while providing for public access and uses consistent with the Wilderness Act of 1964 and the Alaska National Interest Lands Conservation Act of 1980 (ANILCA).

Objectives: In Wilderness, manage for the adopted ROS class. Where ROS has not been adopted, manage for no greater development than Semi-primitive Motorized (with certain localized exceptions due to the effects of activities outside Wilderness and ANILCA exceptions).

Background: Congressionally designated Wilderness in the Tongass National Forest comes from two pieces of legislation. ANILCA established 14 Wildernesses totaling 5.5 million acres within the Tongass. Two of the areas – Admiralty Island and Misty Fiords – were also previously designated as National Monuments. Prior to ANILCA there was no designated Wilderness on the Tongass. In 1990, the Tongass Timber Reform Act (TTRA) amended ANILCA and designated five new Wilderness areas and one Wilderness addition totaling 296,080 acres. This brings the total to 5.7 million acres in 19 Wilderness areas on the Tongass National Forest.

Wilderness Area Question 1: Are standards and guidelines for the management of Wilderness being implemented?

In general, the standards and guidelines for the management of Wilderness are being implemented. Aircraft overflights, boats, and docks are continuing to affect the solitude and primitive Wilderness environment in some Wilderness areas such as Misty Fiords. In these areas, the Wilderness objectives for solitude and primitive recreation are not met. The management of Misty Fiords National Monument is being addressed through interagency collaborative planning efforts.

Current levels of recreational and other uses in some areas immediately adjacent to and in the air above the land base of Misty Fiords National Monument Wilderness continue to impact solitude and the primitive Wilderness environment. An interagency planning process continues that is addressing recreational and other uses that impact the visitor experience in Misty Fiords. In these areas, primarily around Rudyerd Bay and along travel routes to Rudyerd Bay from Ketchikan (approximately 10 percent of the area of Misty Fiords), wilderness objectives for solitude and primitive recreation are not met. The activities creating the impacts include scenic overflights and various types of boating activities. Due to the limited scope of our monitoring effort, we are unable to determine if significant impacts to solitude and the primitive Wilderness environment occur in other areas of the Monument. In Misty Fiords, annual inventory of existing conditions continued by the 2-person multidisciplinary inventory crew. This effort continued based on previous years' activities. Additionally, Wilderness kayak rangers (2 crews of 2 people) conducted set point monitoring of vehicular traffic in several areas in and adjacent to Rudyerd Bay. They also monitored select previously inventoried potential and existing recreational sites to assess the current level of impact

The Admiralty National Monument/ Kootznoowoo Wilderness the monitoring was minimal due to limited staff time. During the year, efforts were made to inspect authorized special uses permit operations related to outfitting; to continue monitoring the bear and visitor interactions at Pack Creek; five cabins had deferred maintenance needs addressed; and condition surveys were performed on three trails and deferred maintenance needs were identified. There were also inspections performed on 15 special use permit cabins and two temporary tent platforms and were fond to be in compliance with their permit conditions.

In the Tracy Arm - Fords Terror Wilderness, it was noted that visitors can expect to encounter more that 6 groups per day and in some places the encounters can exceed thirty groups per day. The encounters occur primarily along the shoreline with motor vessels pass along the saltwater. Visitations are expected to increase in 2002 as a result of the current decision to reduce the numbers of cruise ships allowed into Glacier Bay National Park. In Tracy Arm and Holkham Bay visitors can expect to encounter an average of thirteen motorized vessels per 8-hour day, while in Endicott Arm it averages about 2 per day. Up to 65,000 visitors are estimated to have visited Tracy Arm by cruise ship this year. While this remains much lower than their peak year of 1996 the cruise visitation is growing and is projected to continue growing.

Commercial kayak use (610 visits) in the Endicott Arm is remaining stable but charter boat use (up to 7,500 visits) and mid-size tour boat use (up to 40,000 visits) are both increasing throughout the wilderness. Wilderness rangers contacted up to 2,300 wilderness visitors in TAFT this year through their 31 interpretive visits to boats. An additional 150 people were contacted on land. In other monitoring efforts, campsites were inventoried throughout the wilderness and crab pots illegally stored within the wilderness were impounded.

On the Petersburg Ranger District, the S&G for Recreation and Tourism, Recreation Use Administration, section E. which states, "Maintain existing public use cabins…at present or improved condition," is not being met for the Salt Chuck East cabin. Lack of sufficient funding has prevented heavy maintenance at the Salt Chuck East Cabin where the front deck is rotten and in need of replacement. The Petersburg Lake cabin is in need of reconstruction and doesn't meet the standard, but it will meet the standard if it is funded as outlined in the Design Narrative that was submitted this year for the Region 10 Capital Investment Program. Another shortfall is for the S&G for Threatened, Endangered, and Sensitive Species in the Petersburg Creek – Duncan Salt Chuck Wilderness where inventories have not been done for TES plant species.

The Wrangell Ranger District monitored a potential land purchase; special use permits for outfitters and guides, isolated cabins, pre-ANILCA cabins, tent platforms, research studies; various authorizations for the use of motorized equipment within Wilderness; and the management of public recreation facilities and sites as a part of their regular program of work.

Monitoring Results

Misty Fiords National Monument Wilderness

Various wildlife, vegetation, recreation, cultural, and stream surveys were completed in 13 VCUs within Misty Fiords National Monument. Three VCUs in Misty Fiords National Monument Wilderness were flown over and surveyed from the air, rather than on foot or by kayak.

The Wilderness Ranger crew monitored recreation sites, trails, cultural sites, and fixed-point encounters in eight VCUs in Misty Fiords National Monument Wilderness. These sites and monitoring efforts are part of an on-going monitoring program and have been inventoried in the past. The Wilderness Inventory Crew surveyed 71 saltwater shoreline miles in the Misty Fiords National Monument Wilderness. The 71 miles included: the southern portion of the Revillagigedo Channel from the Black Islands to Foggy Bay, the northwestern portion of Behm Canal from Portage Cove to Cow Creek, the northeastern portion of Misty Fiords Monument including Burroughs Bay and the Klahini River. Twenty-three lake shoreline miles were also surveyed. These lakes included: Kah Shakes, Wilson Lake, Big Goat and Little Goat Lake. Six miles of alpine area were inventoried this season above the Quartz Hill mine, included in Misty Fiords National Monument, but not designated Wilderness.

Twenty-three historical sites were located and documented. Current site conditions were monitored. Several pre-historic midden sites dating to approximately 3,100 years before present were discovered. These sites are currently the oldest sites found within Misty Fiords.

Monitoring of abandoned structures, human modified terrain/ vegetation, and anchored floats was conducted. Two wall tent structures were located in the southern end of Misty Fiords. A cabin on Claude Point was surveyed and monitored. Three floats were located in Foggy Bay, anchored to the ocean floor. These floats are owned by three different fish processing plants located in Southeast Alaska, and are used by the seining and gillnetting fleet that fish in the Foggy Bay region. Above the Quartz Hill Mine site, a small 'A' frame was located along with another half-built large wooden structure. An old radio tower was located as well. Cairns were found along the ridgeline between Quartz Hill and Raspberry Creek. Two fire rings were located along the shoreline of Little Goat Lake. One of these fire rings appeared to be fairly new. Fluted hemlock was often found in the southern portion of Misty Fiords.

Wildlife monitoring was conducted on the Monument. Nineteen bald eagle nests were located along the saltwater shoreline. Three of the nineteen nests were active. Small mammal traps were set along the saltwater shoreline, alpine and subalpine areas, and lake shoreline for a total of 435 trap nights. Twenty-five specimens were caught. Specimens were sent to the University of Alaska at Fairbanks for use and

analysis. Northern Goshawk surveys were conducted. Both visual and audio surveys were accomplished. Three Goshawks were observed although no nests were located. Two Red Tailed Hawks were observed. Fixed point count monitoring was conducted to document encounters within the wilderness by sitting at one of five sites located in the 'core' area of Misty Fiords.

Monitoring of human encounters was conducted during the routine monitoring process. Encounters within the wilderness included float planes, airboats on the Klanini River and overflights by a helicopter.

In addition to the monitoring efforts that have taken place in 2001, the Forest Service has entered into an agreement with the University of Arizona, Tucson through a cooperative agreement with the USDI Fish and Wildlife Service to test a computer software model which displays visitor use on a portion of the Misty Fiords National Monument. The software was first developed by the University of Arizona for use by the Park Service to track outfitter and guide use within the Grand Canyon. This software is now being tested across the world. The Forest Service is testing the software for its utility for future monitoring of visitors in the landscape to track use trends, concentrations of use, and areas of potential impacts. The Fish and Wildlife Service is interested in testing whether or not this model can interact with other data in GIS to note potential impacts to wildlife or fisheries resources. There will be a presentation of the findings in the software application in the spring of 2002 in Ketchikan, which will be open to the public. If funding is available, there will also be additional field verification of this model in Misty Fiords. Additional details describing the scope of work associated with this project is included in the Appendix.

Stikine-LeConte Wilderness

Wilderness managers keep current on the availability of in holding parcels within the Stikine-LeConte Wilderness for possible wilderness acquisitions. In 1999 the owners of a 160-acre parcel in the Wilderness on Farm Island offered to sell their land to the Forest Service. The property is known as the North Knig Slough Parcel. The parcel was again submitted as an FY 2003 land acquisition nomination through the Land and Water Conservation Fund.

Wrangell District special use managers and wilderness rangers administer a variety of special use authorizations within the Wilderness to ensure the activities and structures are compatible with Wilderness designation. The authorizations include: outfitter/guides, isolated cabins, pre-ANILCA cabins, tent platforms, and research studies including helicopter landings. All authorizations are monitored for compliance and demonstration of good wilderness ethic. Many authorizations were renewed this year following the NEPA decisions described below.

The amount of authorized outfitter/guide use within the Stikine-LeConte Wilderness is monitored annually. Use figures for 2001 are not yet available. In August 1997, the NEPA decision was issued for the Stikine Area Outfitter and Guide Environmental Assessment. Allocations for O/G use of two study areas comprising the Stikine-LeConte Wilderness were established by this decision. Thresholds for O/G use in this Wilderness were far from being fully realized in 1997-200.

Special use authorized structures within the Stikine River drainage in 1999 included: 12 isolated cabins, two pre-ANILCA cabins, four research/monitoring cabins, and 10 tent platform temporary camps. All previously exiting authorizations that expired in 2001 have been renewed in 2002. The information gathered is part of special use permit administration in the Wilderness, and is collected for future permit management and administration decisions.

Petersburg High School has been authorized since 1983 to monitor the activity of LeConte Glacier. This project provides measurements of the retreat or expansion of the face of the glacier. All activities, which include helicopter landings, are conducted using the "minimum tool" concept. Information gathered is shared internationally with an ongoing cooperative database on world glaciers for current and future scientific analysis.

The University of Alaska - Fairbanks, Geophysical Institute (UAF-GI) is permitted to conduct three years of research on the dynamics of LeConte Glacier. The research, funded by the National Science Foundation, is aimed at understanding the rapid retreat of a tidewater glacier. All research activities, which include helicopter landings, are conducted using the "minimum tool" concept. As a mitigation measure, UAF-GI provided the Forest Service in 2000 interpretive information explaining their research

activities. The UAF-GI was to provide further interpretive information on the results of their research in 2001. The due date for this information has extended to May 2002 due to personal injury of the principle researcher.

The US Geological Survey, Water Resources Division is permitted to monitor river flow and water levels of the Stikine River at their gauging station near Shakes Slough. To support this activity, USGS holds an authorization for a cabin and stream gauge. Stream flow information collected is part of an ongoing database available from the USGS web site, and is used for current and future scientific analysis. In 2000 the USGS stream gauging station authorization was amended to include winter access with a helicopter.

The Alaska Department of Fish and Game (ADF&G) is authorized to monitor spawning king salmon populations in tributaries along the Stikine River; particularly on Andrew, Alpine and North Arm Creeks. That authorization will expire 12/31/01 and a new authorization will be issued.

ADF&G in cooperation with Canadian Ministry of Fisheries and Oceans personnel, monitored salmon migration on the Stikine River by catching and tagging migrating fish. To support these activities, ADF&G holds authorizations for two cabins including associated helicopter landings. The collected information becomes part of a database used for future ADF&G management decisions, and to support the International Salmon Treaty negotiations.

Admiralty National Monument/Juneau Ranger District Wilderness Areas

The noise and visual impacts from motorized vessels on adjacent marine waters outside Forest Service jurisdiction continue to be issues of importance because of the affect on upland use. ROS guidelines are easily exceeded along shoreline areas when marine use is factored into the number of allowable National Forest encounters, as in Tracy Arm where motorized encounters often reached 30 per day.

Petersburg Ranger District

The Petersburg Ranger District reviewed special use permits for compliance with wilderness standards and guidelines. Two condition surveys of cabins and 5.5 miles of trail was completed. A quantitative measurement of two campsite outfitter/guide campsites in wilderness was accomplished. Wilderness rangers inventoried five remote wilderness campsites. Three field days were spent on a survey of plants to assist in determining TES species and nonnative species in the Kuiu wilderness area. Two days were spent in the field determining the range extent of *Cotula coronopifolia* (Brass Buttons), a nonnative plant that has invaded the upper portions of Duncan Canal. Wilderness rangers compiled information on overflights, public encounters, activities, and number of boats.

Sitka Ranger District

The Sitka Ranger District monitored the West Chichagof/Yakobi Wilderness during a ranger boat trip. Outfitter/Guide special use permits were inspected and noncommercial recreation users were observed enjoying the wilderness area. Monitoring included inspections of special use cabin locations. Non-commercial/non-guided campsites were also visited.

Known locations where outfitter/guides take clients ashore were visited to monitor impacts. Each site visited showed very good compliance with the terms of the special use permit. Guides seem to be conveying and practicing the message of “Leave No Trace” with their clients. Most impacts observed seem to be from non-commercial/non-guided groups, with the commercially guided groups cleaning up after themselves

Evaluation Results

- An interagency collaborative planning approach is being utilized to deal with some of the conflicts on the primitive and solitude environment associated with the noise and visual impacts on adjacent marine waters and in airspace in Misty Fiords.
- The non-motorized/non-mechanized example set by the personnel working in Misty Fiords for minimum impact Wilderness travel, camping, and working is continuing to educate visitors to the Wilderness.

- Cabin condition surveys point out the need to bring the cabins up to standard. Cabins and facilities on the Tongass are currently being addressed either by the district through their regular appropriations, through cabin rental receipts, or through the Regional capitol investment process (CIP).
- The deferred maintenance of recreation facilities/ trails will be emphasized and additional funds will be requested to bring the structures/ trails to an acceptable standard.
- We will continue to monitor the shoreline for outfitter/guide compliance and evidence of trespass.
- The plant monitoring programs in several of the Wilderness areas should continue, to further develop the baseline inventory of these remote Wilderness areas. Plant monitoring will ensure that Wilderness standards and guidelines are being met for Threatened, Endangered, and Sensitive Species, as well as establishing a baseline to monitor plant populations in the Wilderness.
- There are several locations where the level of use is of concern and monitoring needs to continue to determine if any mitigation is required.
- Wilderness ranger visual surveys found that the use at the mouth of Petersburg Creek may have exceeded the Semi-primitive Motorized encounter guideline of six parties on several occasions. This was a qualitative observation since there was not any standardized sampling done to monitor this site.
- The plant inventory in Kuiu Wilderness tentatively identified a rare plant, Netleaf willow, (*Salix reticulata*). Due to workloads and personnel shortages, it has been difficult to do the required office work for complete analysis of the field specimens.
- The field inspections for Cotula coronopifolia found significant amounts of the non-native plant in additional portions of the Duncan Salt Chuck, which is within the Petersburg Creek - Duncan Salt Chuck wilderness.
- Monitoring showed good overall compliance with the terms of the special use authorizations within the West Chichagof/Yakobi Wilderness.
- The Sitka Ranger District maintains a campsite inventory and monitors them on a fixed schedule. Campsites, which were visited, showed no evidence of recent use. New campsites that were found within the West Chichagof/Yakobi Wilderness and showed very minor effects from use.

Wilderness Area Question 2: Are standards and guidelines for the management of Wilderness effective in maintaining the Wilderness resource?

Monitoring activities are summarized in Wilderness Area Question 1. Time spent in the field or office for implementation monitoring was also used to determine effectiveness. The standards and guidelines were effective in maintaining the Wilderness resource with the exceptions as discussed below. The geographic area's large size and complexity, along with limited budgets, make implementation of standards and guidelines difficult to monitor for effectiveness. Conclusions from the area surveyed during FY 2001 indicate that backcountry physical impacts are minimal and the opportunities are outstanding for remoteness and solitude.

Evaluation of the effectiveness of the standards and guidelines will be conducted through examining the pilot project that was initiated in Misty Fiords National Monument in FY 01 and will be complete in FY 02. This project specifically examines the impacts of recreation visitation on wildlife. A summary of this project is included in the Appendix.

Monitoring Results

The Admiralty National Monument, Juneau Ranger District, and Ketchikan-Misty Ranger District all noted noise impacts from motorized vessels on adjacent marine waters or airways outside Forest Service jurisdiction affecting the Wilderness solitude, remoteness, and sense of isolation.

Evaluation of Results

Generally, standards and guidelines have been effective in preserving the Wilderness character, with the exception of low level of social encounters. These social encounters occur along primary travel ways and areas adjacent to waterways at some locations. Air traffic and cruise ship visitation impacts wildlife, visual quality, remoteness, and solitude. Districts will continue to monitor the effects of disturbance from outside the Wilderness such as aircraft uses, and motorboat uses.

To and improve this condition, and to improve understanding of Wilderness, an education program is provided in some local communities in the schools, at Visitor Centers and with outfitter/guides. Presently, Interpretive Kayak Rangers have helped with an understanding of Wilderness ethic to visitors of Misty Fiords Wilderness and Tracy Arms through cooperative partnerships with some cruise ship operators. Districts will continue to monitor the affects from disturbance from outside the wilderness such as aircraft uses, and motorboat uses.

Wildlife

The Tongass National Forest provides habitat for 54 species of mammals (including introduced elk), 231 species of birds, and 5 species of amphibians and reptiles. There are an additional 18 species of marine mammals found in Southeast Alaska waters that depend entirely on the ocean environment, and 45 bird and 3 amphibian or reptile species considered casual or accidental visitors to Southeast Alaska. These species provide many opportunities for consumptive and non-consumptive uses, including commercial, sport, and subsistence hunting and photographic and viewing activities. The Forest is rich in its varied and unique species; some of the species found on the Forest in relative abundance (such as bald eagle and brown bear) are threatened or endangered in other parts of the United States.

Goal: Maintain the abundance and distribution of habitats, especially old-growth forests, to sustain viable populations in the planning area. Also, maintain habitat capability sufficient to produce wildlife populations that support the use of wildlife resources for sport, subsistence, and recreational activities.

Objectives: In addition to objectives included in the Biodiversity section, design and implement non-structural wildlife habitat improvement projects to improve an average of 8,000 acres annually across the Forest. Include a young-growth management program to maintain, prolong, and/or improve understory forage production and to increase future old-growth characteristics in young-growth timber stands for wildlife. Additionally, design and implement an average of 75 structural wildlife habitat improvement projects annually across the Forest.

Background: Since the signing of the 1997 ROD, we concluded that the list of Management Indicator Species (MIS) needed to be updated and that current Forest Plan wildlife monitoring questions are too broad to develop useful monitoring protocols (DeGayner et al. 1999). The Information Needs section of the Forest Plan (Appendix B of the MIS report) and the Administrative Study Information Needs Assessment (ASIAN) (Iverson et al. 1998) were particularly useful in selecting a manageable number of MIS and further defining and integrating these monitoring questions.

Wildlife Question 1: Are population trends for Management Indicator Species and their relationship to habitat changes consistent with expectations? (Also see the biodiversity monitoring questions.)

In FY 2000, draft task group reports for six species were developed to aid with funding decisions. For more information defining the monitoring questions and a summary of species task group reports, see last year's annual monitoring and evaluation report. In FY 2001, the USFWS let a contract with the ADF&G to develop a conceptual framework to evaluate the efficacy of wildlife conservation measures in the Tongass Land Management Plan. This ongoing process may influence which species the Forest Service chooses to study and/or monitor in detail and the development of monitoring protocols.

Shown in Table 2-39 is a summary of some of the wildlife monitoring completed on the Tongass in FY2001. The Tongass did not proceed with any new wildlife monitoring in an effort to cooperate and participate with the ongoing conceptual framework/conservation strategy of the ADF&G and USFWS. Due to personnel limitations, with transfers of people and problems with delays in hiring replacements, the field participation in ongoing monitoring was limited.

Table 2-39. FY 1999, 2000, and 2001 Activities that Contribute to the Understanding of Monitoring Wildlife Habitat or Wildlife Populations (Other Than Task Group Protocol Development)

MIS Candidate Species	FY 1999, 2000, 2001 Monitoring Activities conducted by the Forest Service	Activities by others likely to contribute to long-term monitoring efforts.
Black-tailed Deer	1) ADF&G and FS conducted annual pellet count surveys. 2) Habitat use study and model habitat model review. 3) Deer model review	ADF&G Heceta deer/wolf study (in 5th year).
Wolf	1) Established 4-yr Challenge Cost Share Agreement with ADF&G to study deer/wolf interactions and wolf biology. 2) Pilot project with Petersburg ADF&G to estimate wolf numbers and movements.	ADF&G Heceta deer/wolf study (in 5th year). Contact: Dave Person/Chris Farmer.
Flying Squirrel	1) FSL flying Squirrel study on POW Island completes 3rd year. 2) Mitkof Island flying squirrel Den Study	Flying Squirrel Taxonomy in SE AK. (Joe Cook at U of AK, Fairbanks).
American Marten	1) FS contributed housing and flight time for this work that ADF&G led.	ADF&G analysis of marten data from NE Chichagof Island.
Northern Goshawk	1) Annual nest monitoring conducted by ADF&G and FS. 2) FS and ADF&G entered into a agreement to update the Conservation Assessment for the Northern Goshawk in SE AK (Iverson et al, 1996) with new information.	
Brown Bear		ADF&G analysis of brown bear data on Chichagof Island.

Recommendations for FY 2002

1) Participate in the interagency development of a conceptual framework for monitoring.
2) Complete draft species task group reports developed in FY 2002 for distribution.
3) Complete the first summary of trends in habitats and populations for MIS and proposed MIS as part of an evaluation as directed in the Forest Plan.

Wildlife Question 2: Are the population levels and associated distribution of mammalian endemic species on islands and portions of the mainland consistent with the estimates in the Forest Plan?

According to the Forest Plan Monitoring and Evaluation Guidebook, this question is answered through an annual report on the progress of the small mammal study specified in the Information Needs section of the Forest Plan (Appendix B-2, Forest Plan). This study continued through the year 2001. Additional information describing this study is included in the Research section of this report.

Monitoring Results and Evaluation of Results

During FY 2001 Winston P. Smith and Jeffrey V. Nichols, of the USFS Forest Sciences Laboratory in Juneau, drafted two reports on small mammals. The October 15, 2001, abstract of "*Demography of the Prince of Wales Island Flying Squirrel: an Endemic of Southeastern Alaska Temperate Rainforest*" (55 pages) reads:

"We studied demography of the endemic Prince of Wales Island flying squirrel in coastal temperate rainforest of southeastern Alaska because of conservation concerns over its possible sensitivity to cumulative habitat disturbance. We captured 163 and 237 individuals 778 and 1,176 times with 37,117 and 35,184 trap nights of effort during spring and autumn 1998-2000 in largely unmanaged landscapes of peatland mixed-conifer and upland, old-growth western hemlock-Sitka spruce (*Tsuga heterophylla-Picea sitchensis*) forests, respectively. We derived 3 common abundance estimates: 2 relative abundance indices, capture per unit effort (CPUE) and minimum animals known alive (MNA), and an unbiased estimate of density. We observed significant seasonal and annual variation. Mean values of all estimates during autumn were about 2× corresponding spring values. Squirrel abundance in autumn 1998 was less than corresponding periods in 1999 and 2000. Age and sex composition of the population was similar among years, between seasons and between habitats. When pooled across seasons and years, males comprised a larger portion of the population in upland old-growth (upland-OG) forest than peatland mixed-conifer (peatland-MC) forest. Body condition (i.e., mean body mass) was similar between habitats; mean body mass of adults (122 g) was larger than juveniles (108 g), and was lower for juveniles in 1998 (93.5 g) than 1999 (116.8 g) or 2000 (111.9 g). Minimum summer survival varied considerably among years and between habitats (16.7 – 65.7%) and was higher in upland-OG (54.5%) and lower in 1998 (18.8%) than in peatland-MC (45.5%) and other years (× = 53.1%). Over winter survival was less varied (43.9 – 60.4%) and similar among years and between habitats. Minimum survivorship for 12 (30.5%), 18 (18.2%), and 24 (11.2%) months was similar between habitats. Although mean number of reproductive females was higher in upland-OG (3.9/grid) than peatland-MC (2.1/grid), this was likely attributable to differences in population density rather reproductive rates; percent reproductive females during spring and percent juveniles during autumn were similar between habitats. These results support the assumption in the conservation strategy of the Tongass Land Management Plan that upland-OG forests of southeastern Alaska are primary habitat for northern flying squirrels. Still, we recorded squirrel densities among peatland-MC sites that were higher than that reported for several unmanaged and managed forest types in the Pacific Northwest. Moreover, many of the demographic parameters were similar between upland-OG and peatland-MC. If the results of this study can be generalized across the Tongass National Forest, then peatland-MC likely contributes to breeding populations of northern flying squirrels in managed landscapes and may reduce viability risks."

Smith and Nichols' August 7, 2001, abstract of "*Demography of Two Endemic Forest-Floor Mammals in Southeastern Alaska Temperate Rainforest*" (60 pages) reads:

"We studied demography of two endemic forest-floor mammals in coastal temperate rainforest of southeastern Alaska 1998-2000: an island endemic subspecies of the southern red-backed vole (*Clethrionomys gapperi wrangeli*; [voles]) because of conservation concerns over its possible sensitivity to cumulative habitat disturbance; and an endemic subspecies of the recently revised Keen's mouse, *Peromyscus keeni macrorhinus* (Hogan et al 1993). We live-trapped 1-ha grids and assessment lines to estimate effective area sampled and to derive four measures of abundance (i.e., minimum number known alive [MNA], capture per unit effort [CPUE], MNA density, and Lincoln-Peterson [LP] density) of voles and *Peromyscus keeni macrorhinus* (mice) in spring (Apr-May) and autumn (Aug-Sep) 1999 – 2000 among four prominent cover types: gap-phase old-growth forest (OG), multi-cohort old-growth forest (MC), pre-commercially thinned young (25 yr-old) growth (YG) and old-growth mixed-conifer/muskeg complexes (MK). We also obtained 1998 autumn estimates for OG, MC, and YG. During 1999 and 2000, the rank of cover types based on vole abundance was similar among estimators; OG and MK were consistently the highest and lowest ranked cover types, respectively. In September 1998, however, YG replaced OG has the highest ranked cover type and there was a significant habitat × year interaction among all estimators. Effective area sampled varied among cover types and was much greater than that previously reported for voles; OG (11.8 ha) had a larger effective area than other cover types, which were similar (× = 7.7 ha). Consequently, vole density (× = 3.5/ha) was lower than that reported for western coniferous forests. Rank of habitats relative to minimum summer and overwinter survival was similar to that obtained for abundance estimates, ranging 6 – 26% and 13.6 –17.3%, respectively. Minimum summer and overwinter survival was similar among cover types and averaged 18.3% and 16.0%, respectively.

Mean weight (g) of juvenile (18.0) and adult (24.2) voles differed, but mean body weight was similar among habitats. Sex ratios favored males in all cover types except MK, but age and sex composition was not related to habitat. Mean percent reproductive females also were similar among habitats. For mice, cover type rankings varied in 1999 and 2000 according to estimator but were consistently larger in 1999 than 2000. MK invariably had the lowest abundance and YG was the highest ranked cover type with all estimators except CPUE. YG was consistently the highest ranked cover type in autumn 1998 with a mean LP density (6.0/ha), which was higher than MC (3.4/ha) or OG (3.1/ha). Effective area sampled was similar among cover types, averaging 10.8 ha. Mean weight (g) of juvenile (16.9) and adult (25.3) mice differed, but mean body weight was similar among cover types and between years. Age and sex composition of mice varied with respect to habitat; sex ratios consistently favored males except in MK. Mean percent reproductive females also varied among cover types and were lower for MC (23.5%) than remaining cover types (58.3%). Minimum summer and overwinter survival was similar among cover types and averaged 33.0% and 27.1%, respectively. However, survival in YG (44.2%) was higher than survival among unmanaged cover types (28.3%). Our results are consistent with findings of previous studies in western coniferous forests, which concluded that red-backed vole populations achieve their highest densities in late-seral forests and Keen's mice flourish in a range of forest seral stages and cover types."

Costs and Outputs

Costs and Outputs Question 1: What outputs were produced in the previous year?

Monitoring Results

This output information was obtained from the final FY 2001 Management Attainment Report, which was submitted to the Regional Office in October 2001, and Silviculture, Lands, Timber and Roads Resources. Additional information was obtained from the Annual Reforestation and Timber Stand Improvement Report.

Table 2-40. Outputs

RESOURCE	FY2000	FY2001	TYPE
Land Management Plan			
Monitoring and Evaluation Report	3	1	Report
Ecosystem Management			
Stream Surveys	33.5	129	Miles
Lake Surveys	14,300	17,900	Acres
Terrestrial Ecological Inventories (eco-subregion)	17,000	250	Acres X 1000
Terrestrial Ecological Inventories (land unit)	3,400	0	Acres
Water Resource Monitoring	8	16	Sites
Recreation Use Monitoring	150	0	Days
Vegetation Inventory (eco-subregion)	1,115	15,000	Acres x 1000
Heritage Resource Inventories	1,500	10,600	Acres
Recreation, Wilderness and Heritage			
Seasonal Capacity	2.37	2.37	MM PAOT Days
Special Use Permit Administration	328	597	Permits
Annual Wilderness and Leave No Trace Education	13.8	44,000	Contacts
Wilderness Meeting Forest Plan Standards for Physical and Social Conditions	5,593.9	5,788	Acres
Sites Preserved and Protected	120	122	Sites
Sites Evaluated	54	35	Sites
Sites Interpreted	21	17	Sites
Wildlife Management			
Terrestrial Wildlife Habitat Restored or Enhanced	146	479	Acres
Fisheries Management			
Inland Fish Streams Restored or Enhanced	15	13	Miles
Inland Fish Lakes Restored or Enhanced	466.5	67	Acres
Anadromous Fish Streams Restored or Enhanced	102.5	3	Miles
Anadromous Fish Lakes Restored or Enhanced	6,447.5	4,193	Acres
Threatened and Endangered Species Management			
Number of Sensitive Species for Which Conservation Actions were Accomplished	1	2	Species
Range Management			
Noxious Weeds Treated	20	11	Acres
Timber and Forest Vegetation Management			
Timber Volume Offered	85.3	67.9	MMBF
Timber Volume Sold	170.3	49.6	MMBF
Timber Volume Harvested	146.9	47.8	MMBF
Forestlands Maintained or Enhanced by Stand Improvement	3,792	4,715	Acres
Lands Restored by Reforestation	2,345	4,395	Acres
Soil and Water Management			

RESOURCE	FY2000	FY2001	TYPE
Soil and Water Resource Improvements	902	850	Acres
Minerals Management			
Abandoned Mine Land Sites Reclaimed	7	5	Sites
Bonded and Non-bonded Non-energy Operations Processed	104	93	Operations
Bonded and Non-bonded Non-energy Operations Administered to Standard	8	4	Sites
Land Management			
Rights-of-Way Acquired	8	3	Cases
Special Use Applications Processed	141	97	Permits
Special Use Permits Administered to Standard	165	301	Permits
Land Classification	4	20	Cases
New Boundary marked to Standard	43	38	Miles
Special Area Boundary Location	2	0	Miles
Road, Trail, Dam and Bridge Management			
Road Construction/Reconstruction	72.3	69.8	Miles
Road Bridge Construction	16	4	Bridges
Access Improvement (Deferred Maintenance)	94.6	28.4	Miles
Annual Road Maintenance	3,212	1,186	Miles
Roads Decommissioned	30.2	0	Miles
Bridges Inspected as Scheduled	90	35	Percent
Dams Inspected as Scheduled	100		Percent
Trails Construction/Reconstruction	6.9	2.1	Miles

Costs and Outputs Question 2: Are the costs associated with carrying out the planned management prescriptions (including those of producing outputs) consistent with those costs estimated in the Forest Plan?

Monitoring Results

The FY 2000 allocation and expenditure amounts shown below were obtained from the preliminary September, 2000 fund control report and the information the Forest submitted to the Regional Office for missed year-end obligations. Because the due date of this monitoring report is in November, the final FY 2000 financial reports were not available for use. There are also still problems with some of the FFIS feeder systems (i.e. PCMS) information not getting into FFIS completely or in some cases correctly, so the expenditures shown for FY 2000 may not be 100 percent accurate.

The FY 2001 allocation and expenditure amounts were obtained from the September 2001 fund control report.

It is difficult to make a comparison on the expenditures with FY 2000 vs. prior years. FY 2000 was the first year that the Tongass had all accounting and dollar allocations under one region/unit (1005) combination. Prior to that, dollars and expenditures were in three region/units (1002, 1003, 1005) and not all of the information is available to make the comparison.

Table 2-41. Outputs

EBLI	Description	*Allocated* FY 2000 Budget	*Spent* FY 2000	*Allocated* FY 2001 Budget	*Spent* FY 2001
NFIM	Ecosystem Plan/Inv/Monitor	2,133,763	1,404,772	3,913,600	2,613,940
NFMP	Land/Resource mgmt Plan/Inv/Mon	0	0	392,500	392,106
NFPN	Land management Planning	216,952	267,735	426,700	387,644
NFMG	Minerals and Geology	586,564	466,390	955,400	705,669
NFLM	Land Ownership	1,812,206	1,577,303	2,694,100	1,739,836
NFLE	Law Enforcement	280,137	305,758	328,300	307,717
NFTM	Timber Management	20,089,545	14,524,473	31,072,000	21,192,221
NFRW	Rec/Herit/Wild Mgmt	4,973,759	4,960,662	5,975,100	5,972,085
NFWF	Wildlife and Fish Hab	4,919,351	4,449,427	6,818,900	5,300,072
NFVW	Vegetation and Watershed	5,164,948	4,842,938	3,893,850	3,195,273
NFGA	General Administration	3,664,000	3,530,371	0	0
SMSM	Subsistence Mgmt	1,442,800	1,528,952	2,403,300	2,197,393
WFPR	Fire Management/Suppression	331,073	358,626	718,000	515,423
CMC2	Fire Facilities Construction	0	0	194,500	157,226
CMFC	Facilities	6,867,036	4,551,920	8,191,328	6,837,460
CMRD	Roads	7,599,099	6,845,799	14,854,792	13,180,325
CMTL	**Trail Construction**	5,198,455	1,914,286	4,172,229	2,658,053
Total		**65,279,688**	**52,626,092**	**87,004,599**	**67,352,443**
CWKV	KV	1,331,882	996,151	784,100	631,838
SSSS	Salvage Sale	2,054,474	1,456,989	0	2,373
Total		**3,386,356**	**2,453,140**	**784,100**	**634,211**

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Chapter 3

Evaluation and Action Plans

Evaluation and Action Plans

Introduction

Chapter 3 is comprised of an evaluation of the monitoring conducted in fiscal year (FY) 2001 and action plans based on the evaluation. Through synthesis of the monitoring results, this evaluation provides insight as to whether we are moving toward Tongass National Forest goals and desired conditions. The action plans outline the procedures we will follow to move further toward Tongass goals and desired conditions.

This evaluation is written in the context of the USDA Forest Service Strategic Plan (2000 Revision) goals. These goals and the objectives of the Strategic Plan were developed to guide future agency actions. The four goals are:

Goal 1: Ecosystem Health
Goal 2: Multiple Benefits to People
Goal 3: Scientific and Technical Assistance
Goal 4: Effective Public Service

The desired conditions as defined in the Tongass National Forest Land and Resource Management Plan (Forest Plan) are shown in Table 1-1 in Chapter 1 of this monitoring report.

A crosswalk showing the relationship of the monitoring questions defined in the Forest Plan and the USDA Forest Service Strategic Plan (2000 Revision) goals is shown in Table 1-2, Chapter 1 of this report. A table excerpt from the USDA Forest Service Strategic Plan, in Chapter 1 (pages 1-18 to 1-19), illustrates the specific goals and the associated objectives of the Strategic Plan.

In the evaluation sections below, the goals and objectives are listed with a summary of the status of the Tongass relative to each goal. Following the evaluation sections is an action plan strategy to orient the Tongass toward the goals.

Goal 1: Ecosystem Health

Promote ecosystem health and conservation using a collaborative approach to sustain the Nation's Forests, grasslands and watersheds.

Objective 1.a—Improve and protect watershed conditions to provide the water quality and quantity and the soil productivity necessary to support ecological functions and intended beneficial water uses.

Objective 1.b—Provide ecological conditions to sustain viable populations of native and desired nonnative species and to achieve objectives for Management Indicator Species (MIS)/focal species.

Objective 1.c—Increase the amount of forests and grasslands restored to or maintained in a healthy condition with reduced risk and damage from fires, insects and diseases, and invasive species.

The Forest's ecosystem health is reflected primarily in the answers to the monitoring questions on implementation and effectiveness monitoring associated with air quality, biodiversity, fish habitat, karst and caves, minerals and geology, recreation and tourism, soil and water, transportation, wetlands, and wildlife. These questions relate the monitoring of the implementation and effectiveness of the standards and guidelines associated with the various forest resources.

Objective 1.a

Objective 1.a—Improve and protect watershed conditions to provide the water quality and quantity and the soil productivity necessary to support ecological functions and intended beneficial water uses.

In reference to Objective 1.a, the monitoring completed on fish habitat, soil and water, wetlands, air quality, karst and caves, minerals and geology, recreation, and transportation describe the status of the Tongass relative to ecosystem health. Significant issues addressed in the monitoring this year include items shown in the three categories below.

Fish Habitat, Soil and Water, Wetlands:

- Water quality relative to riparian area designation and protection
- Water quality relative to buffer zone design and layout
- Water quality relative to stream channel protection
- Water quality and quantity relative to fish passage
- Water quality relative to turbidity, sediment transport, and temperature
- Water quality relative to buffer stability and buffer effectiveness
- Soil productivity relative to disturbance
- Soil productivity relative to erosion
- Wetland quality and productivity

Air Quality, Karst and Caves, Minerals and Geology:

- Air quality relative to State and Federal standards
- Karst and cave resources relative to water quality
- Minerals and geology relative to water quality

Recreation and Transportation:

- Recreational off-road vehicle effects on soil productivity and water quality
- Roads and log transfer effects on soil productivity and water quality

Fish Habitat, Soil and Water, Wetlands

<u>Best Management Practice Implementation Monitoring</u>

Evaluation:

The Tongass implements the standards and guidelines for protection of soil and water resources through application of Best Management Practices (BMPs). These BMPs are described in the Soil and Water Handbook (Forest Service Handbook 2509.22, October 1996). This implementation is monitored through a process (defined in the Tongass Monitoring Strategy) that occurs during and immediately following timber sale and road construction administration.

Specifically addressing riparian area designation and protection, stream channel protection and buffer design and layout, these Best Management Practices were successfully implemented on the Tongass. The timber sale administrators worked effectively to implement stream prescriptions, riparian area designations, and stream buffers. Reviewing implementation monitoring results, the BMPs were fully implemented in 100 percent of these situations relating to riparian areas and buffers and corrective action was applied and noted during the implementation monitoring in 7.2 percent of the situations relating to BMP 13.16, Stream Channel Protection.

The Best Management Practices associated with timing restrictions for construction activities and culvert/bridge designs and installation were successfully implemented on the Tongass. The engineering construction contract administrators have worked with the fish biologists to design and oversee installation of bridges/culverts to provide fish passage where required. Reviewing the implementation monitoring results, the BMPs were fully implemented in 90 percent of the situations relating to timing construction to minimize impact to fish resources. Reviewing construction records, 100 percent of the culvert design/installations monitored and corrective action was applied in 7.1% (1 time) of the situations where culverts were installed.

The other issues addressed in the BMP implementation monitoring process include soil disturbance and soil erosion. These BMPs include practices for minimizing surface erosion, revegetation of disturbed areas, identification and avoidance of unstable areas, yarding systems to protect soil/water resources, landing location and design, erosion control measures on roads and units, measures to minimize mass failures, and drainage control structures to minimize erosion and sedimentation. The timber sale administrators worked with the timber sale contract operators to effectively implement these BMPs. Minimal evidence of soil-water interactions, associated with erosion and sediment transport, were apparent on the ground. Reviewing the implementation monitoring results, the BMPs were fully implemented in 99.8 percent of the situations relating to soil disturbance and soil erosion and corrective action was applied in 11 percent of the situations.

Monitoring of BMP implementation showed wetland protection measures were implemented on the Tongass. Prescriptions for wetland protection were followed in the harvest units cut in FY 2001. Areas of wetland were deleted from units primarily during the planning and contract layout phases of the projects. Wetland areas missed during planning and contract layout were deleted during the final layout and contract sale administration or protective measures prescribed and implemented. In areas where forested wetland was harvested, partial or full suspension was prescribed and achieved. Additional buffers were added or areas retained in some harvest units to protect wetlands. Very little to no soil disturbance was noted in the harvested wetland areas. The BMPs were fully implemented in 100% of the units and roads monitored and corrective actions to implement protective measures or delete portions of units showing wetlands were implemented in 5.4% of the situations.

Action Plan:

Considering recent trends in implementation, these BMPs were applied more frequently and implemented more successfully each successive year since 1997. This increase in application of the BMPs in timber units may be partially due to the specific location of the harvest units relative to streams. The increase may be partially attributed to an increased emphasis on stream identification and prescription. In FY 2001, significantly less harvest occurred due to the court injunction that temporarily halted work on the Tongass. Roughly half the number of units was harvested in FY 2001 as compared to FY 2000. Little road construction and reconstruction occurred in FY 2001 due to the limited timber harvest completed and delay in starting the construction season associated with the court decision. The specific road construction work completed on the Tongass was primarily culvert replacements on Class I and II streams and road decommissioning.

Unification of the Tongass and a more standardized monitoring strategy, coupled with training, has contributed to increase the knowledge of the BMPs and implementation monitoring. Minor modifications to the Tongass Monitoring Strategy relative to the 10 percent IDT monitoring effort and the monitoring form were completed in FY 2001. Specifically we had a large and small group IDT review, where the large group would look at issues directly associated with the implementation of the standards and guidelines and the small group would work individually with the district staff, soil specialists, timber sale administrators, yarding system specialists, and construction contract administrators. We added a numerical rating attribute to the form to facilitate review and improve consistency. These changes seemed to improve the monitoring process. We intend to utilize the same two-group approach and use the FY 2001 monitoring forms that include the numerical rating attribute in FY2002.

Emphasis needs to continue on correctly identifying streams during the site investigation and layout phases of timber harvest unit preparation. The sale area maps and unit cards need to correctly depict the field situations and prescriptions need to be accurate. Action on this emphasis will be completed during the early stages of timber sale preparation.

Continued emphasis will be placed on site-specific designs for steep gradient channels, channels with turbulent flow, and shallow bedrock. Specific site investigation and stream simulation design techniques are recommended for complex or non-standard sites. Concern on design of bridge abutments and excavated or old abutment fill slopes relative to soil erosion and sediment transport was raised. In response to this concern, site-specific design will be completed for each site to minimize erosion potential. This design will incorporate information on the fill material and natural angle of repose of the soil/ rock to increase the stability of fill slopes and prevent raveling. In FY 2001, additional emphasis was

placed on stream identification and prescription relative to habitat and barriers to prioritize installations planned for FY 2002. In FY 2001, action was initiated to improve the site investigation and design process. The stream simulation methodology is being used to design culvert and arch pipe installations that will start to be installed in FY 2002. Significant emphasis is needed on application of the turbidity measurement protocols. These protocols will be expanded to cover sites where de-watering occurs.

Emphasis associated with soil disturbance and minimizing erosion will continue. These efforts will focus on seeding temporary roads, ensuring water bars are functional, and avoidance and mitigation associated with soil ruts from shovel logging. During completion of the roads and post haul maintenance, continued emphasis will be placed on BMPs. Efforts will be taken to ensure adequate numbers and spacing of cross drainage ditches and water bars to minimize surface erosion and sedimentation. The IDT group concluded that development of specific BMPs to cover road decommissioning were not necessary. There is no plan to incorporate these roads into the 100 percent monitoring process at this time.

The Best Management Practices are being successfully implemented on the Tongass National Forest. The high quality work of the individuals involved with site investigations, layout, unit design, environmental assessment, and contract administration contributed to this success. Training and communication needs to continue to emphasize the protection of wetlands, productivity of soil and maintenance of water quality.

Soil Disturbance Effectiveness Monitoring

Evaluation:

The soil disturbance effectiveness monitoring was completed through comparing the soil disturbance noted in monitoring relative to the soil quality standards. This work was summarized in the FY 2000 *Forest Plan Monitoring and Evaluation Report*. This monitoring was addressed through examining soil disturbance and landslide data. Specifically addressing soil productivity relative to disturbance and erosion, the monitoring completed showed that the management practices implemented (associated with timber harvest and road construction) were effective in protecting the soil resources.

The soil disturbance monitoring consisted of analysis of soil disturbance transects in harvest units. Monitoring was conducted on steep slope gradient harvest units, a pool of harvest units, and units harvested with shovel yarding systems. This monitoring showed that the observed disturbance for full and partial suspension were well within the limits of allowable soil disturbance. The Regional soil quality standards allow for a maximum of 15 percent of a harvest unit to be in a detrimental condition. This monitoring was supported with other data collected on the Wrangell and Petersburg Districts.

The landslide monitoring/inventory pilot was developed and tested on Wrangell Island in 2001. This inventory will provided data on effectiveness of the Best Management Practices specific to identification and avoidance of unstable areas, and measures to minimize mass failures. The monitoring information will be a subset of the inventory data collected. Additional investigation, data collection and analysis are necessary to infer any substantial conclusions on the landslide data.

Action Plan:

Reviewing the soil disturbance data, the soil scientists recommend no further study nor monitoring of soil disturbance transects. The timber harvest practices and standards and guidelines are providing adequate protection for the soil resources.

The landslide inventory pilot initiated in FY 2001 on Wrangell Island was completed and the protocol is being applied on other portions of the Wrangell District, as well as Petersburg, Thorne Bay, and Craig Districts in FY 2002. Through this inventory, landslides are identified, delineated, and digitized. The inventory will incorporate the existing project level inventories as well as older forest-wide inventories conducted by the Forestry Sciences Laboratory. The existing data will be verified and digitized. Through application of GIS, evaluation of this data will provide information on mass wasting relative to landform, bedrock lithology, elevation, aspect, soil type, and vegetation type as well as management actions. Data update and stewardship are integral parts of the inventory data base strategy.

Water Effectiveness Monitoring

Evaluation:

1) Fish Passage

The monitoring work completed this year provided an evaluation of the effect of current drainage structure and design and implementation practice on fish passage. Most of the current fish passage monitoring work has contributed toward developing a model to predict fish passage in the design of stream crossing structures under different stream conditions. Accessing fish passage is complex with a number of inter-related variables. To date, insufficient data currently exist to adequately assess the effectiveness of Forest Plan fish passage standards and guidelines. Work is under progress to further test the model and assumptions. From our initial analysis, we have identified a need for more information to assess the ability of juvenile coho salmon to pass through structures at various stream flows as well as migration times for these fish. Additional information is needed on the biological implications of a delay in fish migration and migratory behavior of Dolly Varden and cutthroat trout that reside in high gradient headwater streams.

A supplemental assessment was included in the monitoring report that provided an evaluation of the current fish passage capability status of all drainage structures regardless of their design and installation date. This assessment used the fish capability model and assesses mostly older drainage structures designed and installed prior to the effective date of the current Forest Plan. The results provide information for evaluation of the capability of the structures to provide fish passage at design flows. This information was collected to prioritize drainage structures for more intensive investigation. The structures identified as not meeting current fish passage standards, upon further investigation will be evaluated. Replacement of several structures is scheduled for next fiscal year. This is a very dynamic process relative to protocols that are constantly changing based upon new field information gathered as a result of ongoing work.

The data for the fish passage evaluation is being collected through the Alaska Region Road Condition Survey. This survey is ongoing; approximately 95 percent of the classified and 40 percent of the unclassified roads have been surveyed on the Tongass. Thus far, 999 Class I stream crossings and 1,809 Class II stream crossings have been identified on the ground and basic road condition survey data collected. Identification of fish stream locations and characterization is complete on these surveyed sites. Critical measurements for fish passage assessment have not been collected on 124 of the Class I stream crossings and 297 of the Class II structures. Analysis of these structures will be complete as the measurement data is available.

Preliminary assessment of juvenile fish passage is based on a set of assumptions that are preliminary and conservative. Approximately 21 percent of the culverts installed in Class I streams and 9 percent installed in Class II streams have conditions that allow unrestricted fish passage. Approximately 21 percent of the culverts in Class I streams and 13 percent of the culverts in Class II streams need further analysis to determine fish passage capability. Approximately 59 percent of culverts in Class I streams and 78 percent of culverts in Class II streams have conditions that are assumed to restrict upstream movement of juvenile fish at certain flows. The assessment process is dynamic; further analysis of these assumptions and the model criteria is ongoing. Based upon the assessment results from the past two years, modification of culverts that show fish passage limitations has been initiated.

2) Turbidity Monitoring

Water quality effectiveness monitoring on the Tongass was conducted at only one culvert site on the Petersburg District in FY 2001. Turbidity monitoring conducted showed that the water quality criteria for turbidity levels for drinking water were met at this site 64 hours after construction. The data showed only slightly elevated levels downstream of the culvert installation site. No monitoring was completed at the 48 hour time period due to contract administration responsibilities of the engineering representative. In FY 2001, a total of 3 culverts were installed on Class I streams, 2 culverts were installed on Class II streams, 2 Class II bridges and 3 Class II bridges were installed. These reconstruction/construction projects were completed on the Ketchikan-Misty, Petersburg, Thorne Bay and Wrangell Districts. In the protocol, a goal of 40% of the culverts > 48 inches were intended for turbidity monitoring. Additional emphasis is needed on turbidity monitoring and completion of this monitoring according to the protocol.

3) Stream Temperatures

Water quality effectiveness monitoring on the Tongass also included stream temperature measurements. Stream temperature data was available from 18 sites in FY 2001. The stream temperatures at most streams monitored exceeded the most stringent State water quality standards. These high temperatures corresponded to high air temperatures, low rainfall, and low stream flow events. Long term flow information from Prince of Wales (POW) shows decadal climatic cycles have a significant influence on the frequency and duration of low flow events. The stream temperatures on Prince of Wales seem to be more closely related to climatic influence rather than implementation or effectiveness of current Forest Plan standards and guidelines. Understanding stream temperature regimes is essential to cumulative effects analysis, continued management, and restoration of previously harvested watersheds.

4) Culvert Effectiveness

Following up on the interagency review of culvert maintenance and replacement sites on Chichagof Island completed in FY 2000, action was initiated to develop a plan. This effort contributed to provide water quality effectiveness monitoring for fish passage. This monitoring showed that although design standards were fully implemented, the streams did not provide fish passage at all flows. Some of the sites showed streambed erosion and scour that is modifying the stream gradients. The application of general design standards developed for low gradient streambeds to steep gradient sites contributed to this problem. The design process and design standards have been modified since these installations. Further investigation and evaluation of these sites was completed in FY 2001. Evaluation of the site investigation data and habitat evaluations by fish biologists, indicate that further modification of many of the sites is not necessary. Through natural scour and erosion processes, the channels have been redefined. Monitoring by fish biologists have recorded that these structures do not pose a critical problem to fish passage.

5) Stream Buffer Stability

Fish and riparian effectiveness is evaluated through stream buffer stability monitoring. Vegetation in riparian buffers is a significant component in maintaining the natural range and frequency of aquatic habitat conditions. The status of these buffers is tracked by monitoring the change in canopy cover due to windthrow from the year of harvest to several years after harvest. Monitoring the incidence of windthrow in riparian buffers and in control sites will assess if the buffers are retained in a condition found within the natural range of variability. Results from the resampling of stream buffers associated with

harvest units harvested in 2000 indicate no loss of canopy cover. Monitoring will continue at these sites and new sites will be added annually.

6) Stream Buffer Effectiveness

Preharvest surveys have been completed at 26 sites across the Tongass National Forest. Seven of the original 26 sites will be carried forward into post-harvest surveys. In 2001, no post-harvest surveys were completed.

7) Channel Condition Assessment

The channel condition assessments study, on-going on the Tongass, contributed information and protocols for fish and riparian effectiveness monitoring. Channel condition assessments use a cumulative approach; study reaches are limited to low gradient, depositional channels, which respond and retain the signature of many natural and land-management related disturbances throughout the watershed. The biologic component of this study provides a link between the physical measurements, habitat complexity, and the response of salmonid populations. Preliminary analysis has contributed information on sampling plans and methodologies. This analysis has also contributed to further develop hypothesis associated with the physical and biologic response of aquatic habitats in floodplain channels to Forest Plan watershed management practices.

Action Plan (for items 1 through 6 above):

The knowledge and tools to access water quality and quantity relative to fish passage are evolving. The fish passage analysis model currently is based upon assumptions on stream hydrology, culvert hydraulics, fish swimming abilities, and fish migration needs. These assumptions need to be tested for verification and against the Forest Plan fish passage criteria. Further comparison between the model criteria and the fish passage criteria included in the Coastal Zone Management Act, Clean Water Act, and Memorandum of Understanding between the Tongass National Forest and the Alaska Department of Fish & Game is necessary. Work on testing these assumptions and better defining the criteria used in the model is continuing. Expanded application of the model has been initiated and additional data will be available next fiscal year. In an effort to learn additional information about resident fish migration, an administrative study was be initiated in FY 2001. This study will investigate the migratory behavior of Dolly Varden and cutthroat trout in headwaters. Information concerning the relationship between fish movement to time of year, stream stage and size of fish is anticipated. Upon completion of this study, the fish passage analysis model, and additional field trials, we intend to modify our design flow standards for culverts to provide unimpeded passage for these species as required.

Evaluation of the supplemental assessment on fish passage capability status of drainage structures shows that additional work on the assessment criteria and completion of the survey is needed. This assessment provides a baseline of current but preliminary fish passage conditions that can be used to assess the status of fish migration through culvert and bridge structures. This information will be used to track the commitment and progress toward maintaining, restoring or improving opportunities for fish migration. Subsequent work to develop and implement action plans for culvert replacement or modification at sites identified as potentially limiting fish passage will continue.

There is currently an initiative toward maintaining, restoring and improving fish passage along Tongass National Forest roads. The initial inventory and survey of all fish streams and their fish passage conditions along Tongass National Forest roads is nearing completion. Through the cooperation of an interagency group, a state-of-the-art fish passage assessment model has been developed and is being continuously improved. Improved standards for drainage structure design in fish streams are being developed. Study plans to better understand fish migration needs are being drafted. There is currently substantial funding available to correct fish passage problems identified through the survey and analysis process. During the 2001 fiscal year, BMP implementation monitoring effort, 3 Class I culverts, 2 Class III culverts, 2 Class I bridges, 1 Class II bridge were reported as reinstalled or installed. In FY 2002, $220,000 is planned for fish habitat assessments, $741,000 for log stringer bridge replacements, and $1,459,000 for culvert replacement work on the Tongass. Our ability to repair/ improve/ replace culverts is based upon funding/ location and contractual abilities to accomplish work.

The water quality effectiveness monitoring for turbidity needs to be emphasized in FY 2002. More data needs to be collected to draw any conclusions from evaluation of the data. This data should be compared to the State Water Quality standards to evaluate compliance with the State Water Quality standards within the 48-hour variance period. Action plans for turbidity monitoring in FY 2002 include offering training on turbidity monitoring. Work on modifying the turbidity protocol was initiated in late FY 2001. These modifications incorporate new interpretations on the 48-hour variance period; initiating the 48 hours at the initial time the stream is disturbed. Development of a section of the protocol to address sites that are de-watered, is also underway.

Water quality effectiveness monitoring of stream temperature measurements in selected Tongass watersheds indicate monitoring should continue and that additional monitoring be conducted next year. The stream temperature monitoring program was originally designed to address fish kill concerns. This monitoring was conducted at roughly 20 stations on managed and unmanaged watersheds. Results from 18 Prince of Wales Island (Map G-5) sites indicate that the maximum stream temperatures exceeded the most stringent State Water Quality Standards. Recommendations to improve the utility of future temperature monitoring data include: consider developing a forest-wide temperature monitoring program framework that could address water quality criteria as well as fish kill objectives and consider site locations as well as revision of data collection protocols to appropriately address both objectives.

Continued follow-up is planned on the culvert maintenance and replacement sites on Chichagof Island that were part of the water effectiveness monitoring initiated in FY 2000. Several of these sites had maintenance and installation problems that contributed to impede fish passage at certain flows at the time of the initial inspection; however, these sites have been re-evaluated. Natural processes have redefined the stream gradient at a number of these sites and further modifications of these sites were determined by fish biologists as non-critical. The District plans to work with the culvert design team and further evaluate these sites then implement corrective actions as necessary. Additional site monitoring is planned for FY2002. The specific construction modifications deemed necessary will be implemented following the project prioritization process. To better address site-specific conditions in the future, the design process has been changed to incorporate stream simulation.

Reviewing the stream buffer effectiveness monitoring, pre-harvest surveys have been completed at 26 sites across the Tongass National Forest. Seven of the original 26 sites will be carried forward into post-harvest surveys. In 2002, post-harvest surveys will be completed at one site on Craig, two sites on Hoonah, one site on Petersburg, two sites on Thorne Bay, and one site on Wrangell Ranger Districts. Surveys will be compatible with pre-harvest data. Pre- and post-harvest surveys will be compared to evaluate buffer effectiveness. The following actions are recommended for stream buffer effectiveness monitoring in 2002:

- Update stream buffer effectiveness monitoring protocol as a single document with current references to Alaska Region habitat survey protocol and plan for future monitoring.
- Establish GIS points for stream buffer effectiveness sites.
- Ensure survey crew is scheduled to accomplish surveys.

Review of the channel condition assessment study contributed significant information on water effectiveness monitoring in terms of monitoring protocol. Preliminary information has provided information specific to data needs, sampling methodologies, and hypothesis. The results to date indicate that the habitat assessment protocol is objective, consistent, and repeatable when carried out by well-trained crews. Additional variables including, channel to width ratio, relative roughness, and large woody debris loading will be assessed to determine their sensitivity to management effects.

In 2002, channel condition assessments will be completed at any sites that have been subject to watershed disturbance since the last survey. Disturbance could include upstream timber harvest or road construction (King George Creek), landslides or riparian windthrow. New channel condition assessment sites may be established within case study watersheds or at the discretion of individual districts. A publication evaluating data collected through 2001 is expected to help refine future use of this protocol as a monitoring tool by identifying the best response indicators for monitoring channel response to watershed management. In addition, an evaluation of several sources of variability (including measurement precision and variation between crews) will help establish survey frequency and quality

assurance procedures. The following actions are recommended for channel condition assessments in 2002:

- Update channel condition assessment protocol to address Forest Plan monitoring objectives, including a plan for continuing surveys at established and/or new sites.
- Establish GIS points for channel condition assessment sites.
- Determine survey frequency for future monitoring.
- Ensure survey crew is scheduled to accomplish surveys.

Wetlands Effectiveness Monitoring

Evaluation:

Work on development of the wetland protocols specific to wetland classification was initiated in FY 2001. The wetland classification is a critical component to development of the wetland protocols. Plot data was collected in 188 plots that covered four landscapes. This data was entered into an electronic database and spatially located in GIS. This work will contribute information to develop a plan to continue work on the wetland effectiveness monitoring studies. The Glaser study, McGee study, and Wet-soil Monitoring project have tested some of the monitoring protocols for effectiveness monitoring. Upon completion of the classification work, we will be able to complete protocol development. Preliminary indications show that the protocols used in these studies provide appropriate information to evaluate effectiveness of standards and guidelines on several wetland functions and values.

Action Plan:

Work will continue on development of the monitoring protocols for wetland effectiveness. Additional plot sampling will be completed in FY 2002. Efforts will be focused on upper elevations and other wetland communities to fill data gaps. The Glaser study will be expanded to include additional wetland types most impacted by road construction. The McGee study and Wet-soil Monitoring project will be incorporated as possible into the case study monitoring project associated with the aquatic and riparian synthesis.

Air Quality, Karst and Caves, Minerals and Geology

Air Quality

Evaluation:

Monitoring data collected by the Alaska Department of Environmental Conservation (ADEC) indicates that air quality in the Juneau area achieved state and federal air quality criteria. No corrective actions were necessary.

Action Plan:

We recommend no corrective action with respect to air quality on the Tongass National Forest at this time. We also recommend changing the sampling methods for Air Quality from “annually summarize and evaluate available information…” to “every five years summarize and evaluate information from the State Department of Environmental Conservation and the U.S. Environmental Protection Agency.”

Karst and Caves Implementation Monitoring

Evaluation:

Monitoring was completed on projects falling under interim standards and guidelines for karst and caves, as well as projects implemented under the direction of the standards and guidelines in the Forest Plan. Work completed under the Forest Plan karst and cave standards and guidelines included preliminary inventory, timber unit and road reconnaissance, timber unit layout, and road layout. The standards and guidelines were implemented to the fullest extent practical.

Monitoring of the interim Karst and Cave standards and guidelines focused on the Heceta Sawfly Salvage sale on Heceta Island of the Thorne Bay Ranger District. Monitoring focused on the implementation and effectiveness of yarding prescriptions, stabilization of cut slopes associated with roads, windfirmness of

harvest unit edges, and the small buffers surrounding karst features. Special focus was given to effectiveness of yarding techniques used in the harvest of the partial cut prescriptions for feature protection. This island is characterized by catastrophic windthrow events. The implementation of the karst standards and guidelines is dependent upon the effectiveness of the harvest and road construction.

Efforts were made to insure that the karst and cave standards and guidelines were implemented in the planning of the Cholmondeley, Moria, Luck, Staney, Otter Lake, Licking Creek, Gravina Island, Suemez Island, Tuxekan Island and Kosciusko Island Projects. Implementation was completed through resource specialists actions in the planning process, following discussions with contractors and review of their findings, design and analysis of dye trace programs, on-the-ground inventory, resource report writing, writing or review of resource sections of the DEIS or FEIS for the projects, and answering public comments. On the Tuxekan and Kosciusko Island Projects, vulnerability assessments are underway. On the Kosciusko Island project the final karst vulnerability assessment has been reviewed and the watershed assessment is in draft. The original unit pool was reduced to place high vulnerability karst areas in reserves. On the Tuxican Island project, karst inventories have been complete and karst vulnerability assessed. Field reconnaissance and inventory was complete on Licking Creek.

DEIS and FEIS work under the Forest Plan Karst and Cave standards and guidelines included work on the Cholmondeley, Moria, Luck Lake, Staney, Tuxekan, Kosciusko, Otter Lake, Suemez, Gravina, and Licking Creek Timber Sale Projects. These areas were inventoried or are in the process of being inventoried and the proposed unit pools modified to protect the karst and cave resources where present. An effort was made to protect the function and integrity of the karst systems, rather than individual features. The inventory showed that implementation of the karst and cave standards and guidelines outlined in the Forest Plan was better than in the past.

Action Plan:

Monitoring was completed on timber harvest projects that were implemented under the interim standards and guidelines as well as timber sale planning projects under the Forest Plan standards and guidelines. Heceta Sawfly Salvage Sale was modified, after it was sold, to implement the interim standards and guidelines. The karst and cave standards and guidelines in the Forest Plan were implemented in several projects in the DEIS and FEIS planning stages.

The Heceta Sawfly salvage harvest focused on feature protection. This island is characterized by catastrophic windthrow events. Implementation of the karst standards and guidelines was shown to be dependent upon the effectiveness of the harvest and road construction. Continued emphasis of implementation of prescribed timber harvest suspension as well as prudent road location design and construction is essential. Continued monitoring of the implementation of Karst and Cave standards and guidelines is planned. Inventory work on a cave system on the Licking Creek project is planned for FY 2002.

The project planning efforts associated with development of DEIS and FEIS documents has incorporated implementation of the Forest Plan standards and guidelines for karst and caves. These standards and guidelines protect the function and integrity of the karst systems, rather than individual features. In FY 2002, the Tuxekan and Kosciusko projects will move further towards completion of DEISs.

In FY 2000, successful application of LIDAR (Light Distancing And Ranging), high resolution Digital Elevation Models (DEM) and high-resolution orthorectified photographs for feature identification was demonstrated on the Tuxekan and Kosciusko Projects. Recommendation for future project planning includes utilizing LIDAR. This technology generates 10-foot contour DEM model maps. This DEM can be manipulated by software (e.g. Terra Model) that generated and highlighted depression contours. This process can be used to indicate the position of sinkholes, closed basins, insurgences, and resurgences (springs) both through the forest canopy and in the second growth areas. The presence of these features can be verified by aerial photograph interpretation and field reconnaissance. LIDAR generated DEMs planned for these projects will aid in inventory efforts, although significant schedule delays are typical in completing LIDAR work.

Continued training and utilization of karst specialists, hydrologists and soil scientists is essential in implementation of the karst and cave standards and guidelines. It is imperative that vulnerability

classification of karst lands be conducted before timber harvest is planned. The most sensitive areas or those of high vulnerability should be identified and removed from the suitable lands base before harvest units are proposed. Forest Plan implementation policy clarification for karst management standards and guidelines is currently in the review process.

Karst and Caves Effectiveness Monitoring

Evaluation:

Monitoring included only one project that followed interim standards and guidelines for karst and caves, since projects following the karst and cave standards and guidelines in the revised Forest Plan have not been implemented on the ground to date. The monitoring indicates that the interim standards and guidelines for system protection are effective. It is not possible to distinctly determine if the standards and guides for karst and caves in the Forest Plan are effective until additional monitoring is completed. Preliminary indications are that the karst and cave standards and guidelines, where fully applied and focused on system protection, are effective in protecting the integrity of significant caves and karst resources.

Only the Heceta Sawfly Salvage Sale Project on Heceta Island was monitored. Heceta Sawfly was a timber sale that implemented interim standards and guides prior to the implementation of the Revised Forest Plan. Additional protection has been placed around several features not discovered during the original unit layout or the reevaluation. This salvage harvest focused primarily on feature protection. Heceta Island is characterized by catastrophic wind throw events. The effectiveness of the karst and cave standards and guidelines is dependent upon the success of the harvest prescriptions and design and mitigation measures for road construction. The majority of the timber stands monitored remained intact at the close of the 2001 field season. The Heceta Sawfly Salvage sale is now complete.

Action Plan:

Preliminary indications show karst and cave standards and guidelines, where fully applied and focused on system protection, are effective in protecting the integrity of significant caves and karst resources. The minimum standards for karst and cave protection associated with feature protection were implemented in the Heceta Sawfly Project area. The effectiveness of the prescriptions and mitigation was demonstrated. Continued monitoring efforts will focus on the success of the prescriptions in those units and the windfirm nature of the remaining forest and associated buffers. The Interagency Monitoring and Evaluation group recommended setting up permanent transects in the Heceta Sawfly units to monitor the effectiveness of the timber harvest prescriptions and karst mitigation. Preharvest monitoring of caves is significant to determine baseline data on sediment, flow, and windthrow. Inventory and monitoring of the backlog of caves discovered during the past two field seasons is planned for the 2002 field season.

Minerals and Geology

Evaluation:

Active mining operations and non-energy operations were inspected to determine if the effects of the mining activities on surface resources was consistent with the Forest Plan and as allowed in the Plans of Operation. The monitoring included inspection for compliance with agency regulation, review and evaluation of the approved plan of operations and resource protection measures, compliance with State or Federal permits, and compliance with monitoring plans. The specific inspection activities included exploration work sites, reclamation sites, road construction and maintenance, timber removal, public safety, fire prevention, solid waste disposal, and project monitoring. Operators were notified of problems and follow-up action was documented.

Monitoring was completed on one small mining operation on the Juneau Ranger District, five abandoned mines on the Juneau and Admiralty Ranger Districts, and one large mine on Admiralty Ranger District. Generally, inspections of mineral activities indicate that the effects of mining and locatable minerals activities on the surface resources are consistent with Forest Plan expectations, environmental analysis, approved plan of operations, and permit requirements. Continued emphasis of the minerals specialists' inspection and monitoring is necessary at large operations or at sites where the potential for environmental consequences to soil and water resources are significant.

Action Plan:

Monitoring of the minerals operations showed that this monitoring contributes to ensuring protection of the soil and water resources and reducing the potential for significant environmental consequences. The minerals specialists effectively worked with the operators to resolve problems associated with monitoring plans, erosion, site safety/security and developing associated mitigation plans. Required approval of site operation plans provides the Forest Service the opportunity and authority to control the effects of the development of forest surface resources. Recommendations follow to continue the minerals monitoring program.

Recreation and Transportation

Recreation Off Road Vehicles

Evaluation:

Off Road Vehicle (ORV) impact to the soil productivity and water quality monitoring showed that in general, ORV use is causing neither considerable impact nor adverse effects on soil and water resources on the Tongass. The primary ORV use on the Tongass has been four-wheelers and snowmobiles. Snowmobiles generally use forest roads and higher alpine areas although some use was reported in the Stikine-LeConte Wilderness. Use of this equipment is restricted to times when there is adequate snow cover as provided by the Alaska National Interest Lands Conservation Act (ANILCA). Generally the impacts caused from ORV use have been minor damage to wetlands and soil rutting. Some instances of ORV associated impacts were noted in high use areas. In response to these site-specific impacts, the districts have closed some areas where impact to the soil and water resources occurred. The districts worked to educate the public on soil and water resource protection and enforcement to ensure compliance. In Yakutat, the district is working in cooperation with ADF&G to evaluate impacts from ORVs use on the Yakutat Forelands and develop a predictive surrogate for off highway vehicle (OHV) management planning purposes. Monitoring has shown some disturbance to soil, water and wetland resources and evaluation of the impacts is ongoing.

Action Plan:

Evaluation of the Off Road Vehicle (ORV) monitoring shows that some impacts to the soil and water resources were reported. Although most of these impacts were minor, increased use of four-wheelers and snowmobiles could significantly increase the effect on the soil and water resources. Continued monitoring of the impacts associated with ORVs is recommended. Emphasis should continue on high use areas and focus on evaluation of wetland and other high sensitivity areas. Soil and botany specialists should be involved in these site evaluations. Continued emphasis on education of the public on potential impacts associated with ORV use is essential. The Yakutat District assessment of the impacts from ORVs on the Yakutat Forelands is ongoing. Assessment and evaluation of the findings is ongoing and is anticipated to be complete in FY 2002.

Transportation

Evaluation:

Monitoring of access and travel management effectiveness for protection of soil and water resources; log transfer facility impacts associated with bark accumulation in marine waters and oil pollution; and road impacts associated with water quality was conducted in FY 2001. This monitoring showed the standards and guidelines are effective in limiting environmental effects to anticipated levels. The road impacts associated with water quality were monitored through BMP implementation monitoring as well as turbidity monitoring discussed in the soil and water sections of this report.

The monitoring of access and travel management included inspection and evaluation of the effectiveness of gates and barriers on closed roads. This monitoring was completed utilizing the road condition survey data. Data showed that road closure was effective in most cases: 97 percent on classified roads and 98 percent effective on non-classified roads, although 47 percent of the classified road sites and 34 percent of the non-classified roads showed occasional use by non-highway motorcycles and all terrain vehicles. Vegetative closures were effective in blocking highway traffic on roads but 61 percent of the classified

and 39 percent of the non-classified roads surveyed showed occasional ORV use. Pit and mound features and vegetative closures are most effective in blocking roads. Modification of the closure features is planned to deepen trenches, shape mounds, and blockages to prevent circumventing the closure. Contribution to soil erosion and impacts to water quality associated with ORV traffic on closed roads has been minimal. Continuation of the road condition survey process is planned.

Bark accumulation and oil sheen were monitored at log transfer facility (LTF) sites during FY 2001. Documentation on the volume of timber processed through the LTFs was completed. Bark accumulation monitoring is required under the EPA NPDES permit for LTF sites that transfer more than 15 mmbf during the next 5 years and are located less than 60 feet mean lower low water (MLLW). The bark accumulation data was used to determine compliance with the Alaska State Water Quality Standards for settable residues in marine waters. Preliminary bark monitoring dives and pre-discharge bark surveys were conducted at 33 LTFs in FY 2001. Only three of these LTFs, Thorne Bay, Saginaw Bay, and St John Baptist, had a continuous coverage of bark and wood debris that exceeded both 1.0 acre and a thickness of 10 centimeters. These sites will be managed in a manner that will not contribute to further bark accumulations until the current bark remediation study has been completed and agreed to by all participating agencies. This approach is intended to result in the development of defined methodologies to bring these sites into compliance with current permit requirements.

Action Plan:

Monitoring of access and travel management showed that some of the closure features installed are passable by off road vehicles (ORVs). The closure features on these roads will be modified so the structures are impassable to vehicular traffic as well as ORVs. Monitoring of access and travel management effectiveness is completed through the road condition survey process. The initial survey of the roads on the Tongass is anticipated to be complete in the next few years. Subsequent survey of some roads will be conducted as changes in access and travel management occur.

Bark accumulation and oil sheen monitoring provide information to determine compliance with Alaska Water Quality standards for settable residues in marine waters as well as to satisfy requirements for the EPA NPDES permits. This monitoring provides information to evaluate potential impacts to water and soil resources. More extensive monitoring will be conducted at the sites, which show accumulations requiring annual monitoring per regulation. The monitoring of oil sheen is also required by regulation and will continue at all sites during times of operation. The monitoring of bark accumulations and oil sheens will continue in the next fiscal year.

During periods of log transfer operation, receiving waters at the LTF will be visually monitored daily for the presence of an oil sheen. Daily Oil Sheen Logs will be maintained at the Districts. The presence of any oil sheen shall be recorded, with the date, name of observer, cause of or source of oil sheen, and corrective measures taken; this information will be reported to the Lead Tongass Environmental Engineer. This information will be included in the annual report that is due by January 31 of the year following each calendar year of operation and discharge under the General NPDES Permit.

Objective 1.b

Objective 1.b—Provide ecological conditions to sustain viable populations of native and desired nonnative species and to achieve objectives for Management Indicator Species (MIS)/focal species.

In reference to Objective 1.b, the monitoring completed on biodiversity, fish management indicator species (MIS), endemic wildlife species, and wildlife MIS describe the status of the Tongass relative to ecosystem health. Significant issues addressed in the monitoring this year included:

- Maintenance of contiguous blocks of old growth to support viable and well distributed populations of old growth related species.

- Effects of biodiversity:
    - Consistency of management practices with sensitive species conservation
    - Population trends for fish MIS related to habitat changes
    - Population trends for wildlife MIS related to habitat changes
    - Population levels and associated distribution of mammalian endemic species

Biodiversity, Fish Management Indicator Species, Wildlife Management Indicator Species

Biodiversity- Old Growth

Evaluation:

Monitoring has shown that contiguous blocks of old growth have been maintained in a system of old growth reserves to support viable and well distributed populations of old growth related species. Project level environmental documents and Forest Plan amendments were reviewed for information on associated effects on the spatial distribution, size, and composition of old growth reserves (OGRs). A detailed evaluation of the OGR system was completed in 1997 and serves as a benchmark to the conditions of the system at the time the Forest Plan Record of Decision (ROD) was signed. Analysis of the OGR system concludes that this system is sufficient for evaluation. Monitoring for changes to size and composition of old growth reserves was completed. Since the signing of the Forest Plan in 1997, 16 environmental documents have changed the size or composition of the old growth reserves. The Old-growth Habitat land use designation (LUD) has increased in size since the signing of the ROD by 12,051 acres containing 5,008 more acres of productive old growth. Old-growth Habitat reserves modified during fiscal years 1998 – 2000 exceeded productive old growth requirements. The OGR guideline for the Tongass is 57,754 acres; there are currently 72,122 acres of OGR. Project level decisions have generally increased the size and improved composition of old growth reserves.

Biodiversity analysis completed for the Forest Plan assumed that the amount of timber harvest is an index of potential effects on biodiversity. The harvest units were tracked through GIS by province and volume strata. The acres of productive old growth (POG), treated by some type of timber harvest method, were tracked and summarized by ecological province. Forest Plan biological analyses assume the maximum level of timber harvest will be achieved. The annual harvest levels of POG in the past three years have been significantly lower than the predicted levels. The magnitude of timber harvest and the potential impacts on biodiversity have been less than those forecasted in the Forest Plan.

Biodiversity- Threatened and Endangered, Sensitive Species

Biodiversity monitoring also focused on evaluation of management practice consistency relative to the current knowledge about sensitive species. The monitoring regarding sensitive species showed no formal evidence of need for revision of the Regional Forester's sensitive species list. No new information was collected in FY 2001 that was inconsistent with the standards and guidelines and LUDs of the Forest Plan.

Monitoring was conducted by analysis of four sampling efforts:

- Annually review [Forest Service] files and recent information regarding sensitive species taxa on the Tongass National Forest.
- "Consult with other agencies regarding [management practices for] these species and whether additional species should be considered for addition to the Region 10 sensitive species list" (Forest Plan page 6-5). Summarize the results of any consultations with ADF&G and USFWS under the MOU with those agencies.
- Evaluate data collected in studies to determine the need for changes in the standards and guidelines of the Forest Plan.
- Summarize results of Biological Evaluations [BEs] and associated effectiveness monitoring conducted at the project level.

Part 1, Formal Reports and Presentations on TES Species

Marine Mammals. The limited monitoring of the effects of human use on marine mammals did not demonstrate noticeably negative effects. The Forest Service should ensure that employees and permittees are educated about regulations that pertain to marine mammal disturbance. More sea lion and harbor seal haul outs should be monitored for frequency of human visitation and behavioral disturbance. Perhaps each Tongass Ranger District should conduct annual monitoring of one or two locations, somewhat similar to the Brother's Island monitoring reported in Chapter 2, but following a consistent and quantitative protocol Tongass-wide. Also, some consideration should be given to monitoring harbor seal pupping sites and haul outs with respect to human disturbance.

Trumpeter Swans. The Forest Plan requires protective habitat buffers around all estuaries and lakes, and limits development and disturbance within ½ mile of any location used by nesting, brood rearing, or wintering trumpeter swans. Such strong protection, along with the increase in swan population since the 1980's, implies that Trumpeter Swans are secure on the Tongass National Forest.

Goshawks. Due to extensive past timber harvest, goshawk monitoring on POW needs to be greater than elsewhere, and more care needs to be taken with the management of goshawk foraging habitat.

The goshawk survey and monitoring database and GIS layer were expanded to cover 1,971 surveys 1992-2001 (except some maps could not be located for entry of survey routes into GIS). The database should allow more accurate tracking of occupancy of historic nest areas, because the likelihood of detecting a goshawk varies with observer quality, survey technique, level of effort, timing of surveys, and location and distribution of the surveys. The database should also permit more accurate comparison of inventory detection rates among landscapes with different habitat compositions and different suites of prey species. Furthermore, the survey database encouraged the complete storage of data where it was used, a huge amount of information was lost when no survey database was in place until 2001. The Forest Service plans to continue to monitor known nest sites in cooperation with ADF&G. The next logical step in goshawk monitoring is not clear. Currently, the Forest Service supports summarizing the past 10 years field data then designing a monitoring scheme based on its conclusions.

Wolves. The viability of the Alexander Archipelago Wolf appears secure; however, wolves are expected to decline at a rate faster than the decline in deer habitat capability (Person 2001). Wolves and deer are subject to succession debt, wherein the inexorable pattern of forest succession initiated by past harvesting of timber will have long-term effects on the predator-prey system. Future changes in forest management likely will do little to alter the decline in habitat for deer because most of that loss will be due to logging that occurred prior to the revision of the Forest Plan in 1997. On Prince of Wales Island after 2045, wolves may be close to the minimum population of 100 wolves recommended by the U. S. Fish and Wildlife Service for a subpopulation within a larger metapopulation of wolves (Person 2001). The population of wolves in game management unit 2 will be close to a marginal level, limiting options for population management, and making it more vulnerable to random events that affect mortality of wolves and deer. Such trajectory implies a future where it will be difficult to simultaneously provide deer for both wolf viability and human subsistence on Prince of Wales Island. To conserve wolves, it is important to maintain high-quality habitat for deer, and also to limit the construction of new roads. ADF&G and the Forest Service have entered into a Challenge Cost Share agreement to further study the interactions of deer habitat, deer, and wolves and to test the hypothesis suggested by the simulation model in Person's thesis.

Moonworts. Although the two plant species under the general name "moonworts" (*Botrychium ascendens* and *B. sp.* (unknown)) are not listed as TES Species, particular interest in these species exists on the Tongass due to their rarity and lack of understanding of their demographics. Presently, they are proposed sensitive plant species. One ecological study of *Botrychium* in Yakutat, Alaska is currently underway, and a report (Johnson-Groh, Cindy. 2001. Permanent plot monitoring of moonworts (Botrychium) in Yakutat, Alaska. Biology Department Gustavus Adolphys College, St, Peter, MN) states:

> "Whereas it is premature to draw any conclusions from the trends in these populations, it is helpful to examine the trends. Based on previous research on Midwestern *Botrychims* we know that populations vary considerably between populations and between years both in number and in size. There was an overall decrease in the population and an increase in the size in 2001 for both plots.
>
> It is recommended that continued monitoring be conducted to determine the population variation and resiliency. Long term monitoring is important as *Botrychium* populations are inherently variable and monitoring helps to determine what is natural population variation and what is abnormal and likely due to human caused disturbance."

Sensitive Species List. The Regional Forester's Sensitive Species List has not been updated since 1994. Some species may now be sufficiently protected by the 1997 Forest Plan so that Sensitive status is no longer necessary. Meanwhile, other issues have become known since 1997 (e.g., band-tailed pigeons) that suggest either new sensitive species or new Forest Plan standards and guidelines. A need to revise the sensitive plant list exists, based on evidence that many of the sensitive plants are actually more common than many of the rare plants not mentioned in this report.

LUCID Sustainability Model. The overall intent of the systems framework of the Tongass LUCID model is to inexpensively "flag" potential problems before they arise, so that the potential problems can be intensively monitored and studied before they can cause significant harm. The Tongass LUCID team ran the model. However, outputs were generally unreliable due to inadequate time and resources to compile and enter existing data. It is recommended that time and resources be allocated to compile existing ecological data for the model, as well as to analyze the potential value of collecting the other data that would be needed to run all parameters of the Tongass LUCID ecological model.

Part 2, Letters from Other Agencies on TES Species

The Forest Service needs to determine how to apply Forest Plan standards and guidelines intended to prevent disturbance to marine mammals to permittees and contractors. The primary problem arises when a permittee or contractor is on or above the sea when traveling to or from a timber sale or other activity authorized by the Tongass National Forest.

Pending the outcome of the petition to list the Kittlitz's Murrelet as Threatened, some attention should be paid to the Kittlitz's Murrelet in NEPA documents for projects within its habitat.

Part 3, Analyses of Forest Plan Standards and Guidelines for TES Species

Sensitive Plants. There is limited monitoring on the effects of management activities on sensitive plants. Significant standards and guidelines for avoidance of sensitive plants are limited and completely lacking for rare plants in the Forest Plan. Monitoring effectiveness of standards and guidelines on sensitive plants is not a part of the monitoring plan.

Wildlife Biodiversity Monitoring. *The Charter for Monitoring Task Groups for Wildlife MIS on Tongass National Forest* (6 pages, March 9, 2000), along with its transmittal letter by the Forest Supervisor (March 14, 2000), approved a system developed during 1998 and 1999 to objectively develop priorities for monitoring Forest Plan wildlife assumptions. During FY2001, ADF&G began a framework process. This process led to delaying work as defined in the March 2000 *Charter for Monitoring Task Groups for Wildlife MIS on Tongass National Forest,* as well as postponing work on some monitoring plans. The Forest Service faces a considerable challenge in developing the means to monitor the effectiveness of the Tongass Conservation Strategy in a cost effective manner. The FY2002 field season is limited by available personnel.

Goshawks. During fall 2000, the Goshawk Task Group Report, which was authorized by the March 2000 Charter for Wildlife MIS, recommended using ground-based monitoring and satellite telemetry to assess goshawk natality, survival, home range size and home range overlap, to determine goshawk demography and density in various types of landscapes. Over the first half of calendar year 2001, a decision was made to postpone goshawk study and monitoring because: 1) the amount of new information being

gained by the study may be diminishing and 2) we needed to free up personnel/resources to work up the 10 years of data already collected.

Part 4, Forest Service BEs/BAs for Projects and Activities

Biological evaluations (BEs) were conducted for 42 projects and activities during FY2001. The number of BEs varied widely among the Tongass Ranger Districts. In almost all cases, the determination was either "no effect" or "not likely to adversely affect" or wording with similar meaning. Occasionally a determination was "may affect individuals but not likely to adversely affect population viability" or "may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species." This occurred four times for the Queen Charlotte Goshawk, once for Trumpeter Swans, four times for *Hymnophyllum wrightii,* three times for *Arnica lessingii* ssp. *norbergii,* twice for *Carex lenticularis* var. *dolia,* twice for *Poa laxiflora,* twice for *Romanzoffia unalaschcensis,* once for *Aphragmus eschscholtzianus,* once for *Glyceria leptostachya,* and once for *Ligusticum calderi*. The BE for the Mop Point Timber Sale on Ketchikan-Misty Ranger District arrived at the determination of "may affect" for *Hymenophyllum wrightii*. The BA for the Threemile Timber Sale on Petersburg Ranger District made a determination of "may affect, but not likely to adversely affect" with respect to the humpback whale, the Steller's sea lion, the Snake River chinook salmon, the Columbia River chinook salmon, the Puget Sound chinook salmon, the Willamette River chinook salmon, the Snake River sockeye salmon, the Lake Ozette sockeye salmon, the Snake River Basin steelhead, the Columbia River steelhead, and the Willamette River steelhead.

Action Plan:

Evaluation of management practice consistency relative to the current knowledge about sensitive species shows no need expressed formally for revision of the Regional Forester's sensitive species list at this time. Consideration should be given to re-evaluate the list relative to the extensive amount of additional land protected since development of the list. The Tongass Forest Plan standards and guidelines for sensitive species generally appear adequate. We know more now than we did in 1997 about the potential efficacy of standards and guidelines for sensitive species. However, a mechanism needs to be found to apply the marine mammal disturbance standards and guidelines to non-Forest Service personnel and vehicles not under the direct supervision of Forest Service personnel (e.g., log rafts under tow). The design of the partial harvest standards and guidelines for goshawks and marten should perhaps be reconsidered. Completed analyses should fully consider that the existing standards and guidelines call for a fairly even distribution of the leave trees. Potentially, this might be the best system for the majority of rainforest forest biota as well as best for the long-term ecological function of the stand many decades into the future. For BEs and BAs, Tongass biologists need to consider the most recent list of T&E species as provided by the NMFS and the USFWS. Forest biologists and botanists need to assure consistency. Continued emphasis needs to be placed on description of logic and survey results for the determinations.

Fish Management Indicator Species

Evaluation:

Fish Management Indicator Species (MIS) monitoring included progress on protocol development for the anadromous fish, and implementation of the resident fish MIS protocol. A technical team of Forest Service specialists and an advisory team of employees from the cooperating agencies continued to meet and a plan for synthesizing the aquatic monitoring was developed.

Following successful completion of pilot monitoring in 1999, a full monitoring program for trends in the populations of resident cutthroat trout and Dolly Varden char and their habitat initiated in 2000 continued into a second year. The full program focused on locating additional streams meeting the specific criteria identified in the monitoring protocol and making population estimates and completing Tier 3 habitat surveys in all identified streams. The protocol incorporates a design that requires monitoring streams before and after timber harvest. Six treatment streams and one control stream were sampled for the third year in this long-term program, while others were sampled for the first time.

The resident fish protocol was applied to monitor resident fish populations for cutthroat trout and Dolly Varden. During the last three years, population estimates for resident cutthroat and Dolly Varden have been completed in 19 treatment streams and for six of those streams we now have three years of population data). Population estimates have been completed in three control streams above barriers with resident fish but with no planned future logging. We have three years of data for one of those control streams. Of the 22 streams sampled for fish populations, eight have cutthroat and Dolly Varden, seven only cutthroat, and seven only Dolly Varden. The estimated number of cutthroat and Dolly Varden varied widely among the sampled streams.

The removal method population estimate was not possible in one instance as the final catch increased substantially from the first or second catches. We believe this is a random error caused by the low number of fish of that species in those streams. Generally the 95 percent confidence intervals around the estimated number of fish are narrow.

No trend analysis of the data is appropriate at this time. Potential trends in fish populations and habitat features due to forest management will only be possible following collection of several years of pre-harvest and post-harvest data. One watershed upstream from a treatment site was harvested in 2001 and most are scheduled for harvest within the next three to five years. The protocol recommends allowing two years following timber harvest before beginning to sample the fish populations to allow for potential response from logging. As planned, the first post-harvest sampling will occur in 2004.

Action Plan:

Year 2001 was the second year for a full resident fish MIS monitoring program. A pilot run in 1999 was successful and the IMEG decided to move to full implementation of the protocol. A major goal for the year was to monitor all identified treatment and control streams. This goal was achieved.

Control streams were added to the design in 2000 following a recommendation from the IMEG. Control streams are not required for the paired-t test, but will help to explain changes in the fish populations that might not be related to timber harvest. We plan to focus our resources on adding more treatment streams, but will also include controls where possible.

Considering the resident fish work for next fiscal year, we plan to continue our work with population estimates completed by district and SO employees. An employee was hired in 2001 to lead the population estimates and the habitat surveys. This person traveled to the ranger districts and linked up with district employees to complete the surveys for the districts in the northern and central Tongass. The Ketchikan-Misty and Craig Districts completed their own monitoring primarily with crews with previous monitoring experience. Both approaches achieved consistent results and we plan to repeat that next year.

Progress was made in developing monitoring protocols for coho and pink salmon MIS and this work is planned to continue in the next fiscal year. The Forestry Sciences Laboratory, working with the Alaska Department of Fish and Game, has prepared a proposal to develop a protocol that will include annual monitoring of the number of juvenile coho in the case study watersheds. For pink salmon, we initiated review of spawning escapement data that has been collected in over 700 watersheds over the last 30 years and timber harvest history for the same watersheds. If trends are detectable in the existing data, we plan future monitoring to see if trends in pink salmon are also evident with logging conducted under the current standards and guidelines. If trends between logging and pink salmon escapement are not evident in the older data, we probably will not spend the resources to monitor for potential effects of future logging.

Kuiu Island has been selected as a pilot for review of the existing pink salmon escapement and logging history data. Eighty-one streams have been identified on Kuiu that have long-term escapement records and logging histories including the amount and location of the logging and the roads stored in the Forest Service GIS database. We have linked the watersheds with escapement data to the Forest Service GIS covers and have summarized some of the initial data. We now need to identify statisticians to complete the trend analysis and must decide if we should expand the monitoring beyond the Kuiu Island pilot project.

Action Plan:

Wildlife Management Indicator Species

Evaluation:

Since the signing of the 1997 ROD, we concluded that the list of wildlife MIS needed to be updated and that current Forest Plan wildlife monitoring questions are too broad to develop useful monitoring protocols as discussed in the *Tongass National Forest Annual Monitoring and Evaluation Report for FY 2000* (USDA Forest Service 2000). We also recognized that the methods for monitoring the MIS, such as reviewing harvest statistics, were not adequate and that more complete monitoring protocols needed to be developed.

The number of wildlife MIS was recommended to be reduced from 13 species to 6 species. The goshawk, Alexander Archipelago wolf, Sitka black-tailed deer, American marten, brown bear, and northern flying squirrel were selected as potential Management Indicator Species (MIS) for monitoring protocol development. These species were selected because they played a key role in the development of the old-growth conservation strategy and other wildlife conservation measures implemented in the Forest Plan (DeGayner et al. 1999). However, this recommendation is contingent on interagency agreement that credible and cost-effect monitoring plans can be developed for the species.

We proposed that the updated list of MIS (DeGayner et al. 1999) and current Forest Plan wildlife monitoring questions (USDA Forest Service 1997) be reframed to more tightly tie them with management issues. The monitoring questions need to be linked with potential environmental "stressors" (i.e., management activities) and in turn link "stressors" of ecosystem integrity with potential MIS species. As described by Noon et al. (1997), "indicators" of ecological stress are aspects of the biology of the species that can be measured and are influenced by the stressor. MIS task groups were originally directed to identify the actual "indicators" -- the actual parameters to be measured during monitoring to evaluate the species model. Potential indicators include parameters such as population density, abundance, site fidelity, reproductive rate, mortality rate, home range size, population structure, and so forth. The species-specific task groups were to select indicators based on their apparent demographic significance and strength of tie to the ecological stressor, along with the potential to compare (at a reasonable cost) indicator measurements between landscapes that have been treated differently.

In FY 2000, a species task group was established for each of the six recommended MIS. These groups were charged with developing monitoring plans to evaluate how well conservation measures in the Forest Plan protect MIS habitat and populations. Specifically, the task groups continue to work on developing a strategy to evaluate whether population trends for Management Indicator Species and their relationship to habitat changes are consistent with expectations in the Forest Plan. In FY 2001, the USFWS worked with AGF&G to develop a conceptual framework to evaluate the efficacy of wildlife conservation measures in the Forest Plan. This process is ongoing and may affect which species the Forest Service elects to study and monitor, as well as the development of the monitoring protocols.

The Forest Service is supporting several monitoring activities and administrative studies that we believe will be useful for addressing these issues. Table 2-39 summarizes these activities.

Action Plan:

Work is anticipated to continue to update the Wildlife MIS list to reduce the number of recommended species for monitoring. The species being considered include goshawk, Alexander Archipelago wolf, Sitka black-tailed deer, American marten, brown bear, and northern flying squirrel. Recommendations follow to reframe the current Forest Plan wildlife monitoring questions to more tightly tie them to management issues. Leveling of the MIS task group reports and incorporation of the conceptual framework information from the interagency work of USFWS and ADF&G continues. Completion of the task group reports is anticipated in FY 2003. Completion of the first summary of trends in habitats and populations for MIS and proposed MIS are part of an evaluation as directed in the Forest Plan.

The first summary of trends in habitats and populations for MIS and proposed MIS will be initiated. Planning Regulations (36 CFR 219.19 (a)(6)) direct that "Population trends of MIS will be monitored and

relationships to habitat changes determined." Population trends may be inferred using species-habitat relationships information. This approach involves inferring population trends from trends in amount and condition of habitat over time, based on known relationships between species and habitat.

Following are the Wildlife MIS proposals for which funding was authorized for FY 2002, which are summarized in Table 3-1. In addition to this list, funds were allocated to review the conservation strategy. The evaluation criteria used to select projects included:

- Grounded in task group reports of 2001
- Current interagency agreement (as per Gene DeGayner's summary of his February 2001 contacts with ADF&G, and Larry Meshew's contacts on 2/28 and 3/1 with Kim Titus, Chris Iverson, and Teresa Woods)
- Helps to determine whether the species would be a good long-term indicator species; or helps to resolve questions over assumptions in the Forest Plan

Table 3-1. Wildlife MIS Projects Funded for Monitoring in FY 2002

WL Task Group Reports and WL MIS Planning
Tongass Support of Study of Ecological Relationships of Wolves, Deer and Habitat
Evaluation of the Utility of a Nutritionally Based Model for Deer Habitat
Marten- Logistical support including housing and flight time
Brown Bears Model Field Study
Goshawk Nest Monitoring

2004 Forest Plan Review: Wildlife MIS

The mid-course Forest Plan Review, as agreed upon in the 1997 ROD, will address economic, social, wildlife, fisheries, and other resource issues and identify potential mid-course corrections in management direction within the Forest Plan. The Forestry Sciences Laboratory, in an interagency fashion, will lead these analyses. The Lab will ask the following questions:

- Are the management strategies meeting plan objectives?
- Are the assumptions under which the plan was developed still valid?
- Is there new information that would question the ability of the plan to achieve objectives?

This section defines the role and scope of MIS monitoring as it pertains to the five-year Forest Plan Review. MIS monitoring is designed to provide information in support of the evaluation of the conservation strategies, but a larger, "bigger picture" approach is needed to actually evaluate the conservation strategies. Evaluating effectiveness of the conservation strategy is a task that would likely never be assigned to any one research or monitoring project. It is an undertaking that would cross disciplinary boundaries. Such an undertaking clearly falls into the domain of synthesis and is larger in scope than MIS monitoring. For example, the evaluation of the efficacy of 1000-foot beach buffers may require information on flying squirrel dispersal patterns, goshawk habitat selection, and efficacy of management practices in the adjacent matrix lands.

Collectively, findings from MIS monitoring, other monitoring analyses, new scientific literature, and administrative studies will feed into workshops and other synthesis efforts to evaluate management strategies in the Forest Plan.

Small Endemic Mammals

Evaluation

In FY 2001, Winston P. Smith and Jeffery V. Nichols of the Forestry Sciences Laboratory in Juneau wrote two reports including *Demography of the Prince of Wales Island Flying Squirrel: An Endemic of Southeastern Alaska Temperate Rainforest*. The FSL study demonstrated that higher flying squirrel densities in upland old-growth forest exist on POW than in the Pacific Northwest. While flying squirrel densities on POW Island are higher in upland old-growth forest than in peatland-mixed conifer complexes, most of the demographic parameters are similar between upland old-growth forest and

peatland-mixed conifer complexes. If the results of this study can be generalized across the Tongass National Forest, then peatland-mixed conifer complexes likely contribute to the breeding populations of northern flying squirrels in managed landscapes. Viability risks for flying squirrels may be lower than was assumed during the development of the Tongass Forest Plan.

The study on southern red-backed voles and Keen's mice (Smith and Nichols August 2001) provides basic demographic information, which was previously lacking for Southeast Alaska. The information suggests that the viability of both species is very secure, even in managed landscapes. Demographic data did vary by type of habitat, year, and season, which has implications for management of ecosystem function.

Action Plan

Dr. Smith plans to complete three additional reports on small endemic mammals during FY2002: (1) *Habitat Relations of the Prince of Wales Island Flying Squirrel: an Endemic of Southeastern Alaska Temperate Rainforest,* (2) *Habitat Relations of Two Endemic Forest-Floor Small Mammals in Southeastern Alaska Temperate Rainforest,* and (3) *Evolutionary Diversity and Ecology of Endemic Small Mammals of Southeastern Alaska with Implications for Forest Management.*

Objective 1c.

Objective 1.c—Increase the amount of forests and grasslands restored to or maintained in a healthy condition with reduced risk and damage from fires, insects and diseases, and invasive species

In reference to Objective 1.c, the monitoring completed on biodiversity describes the status of the Tongass relative to ecosystem health. The significant issue addressed in the monitoring this year was:

- Destructive insect and disease organism status relative to increases to potentially damaging levels following management activities.

Biodiversity

Evaluation:

Most occurrences of insect and disease are natural and considered a part of, and contributing factor to ecosystem diversity. Endemic levels of insect and disease activity are usually allowed to run their course. Heart rot decays are a key agent causing small-scale disturbance in the Tongass resulting in bole breakage in older trees. Average defect in late seral stands is approximately 1/3 of gross volume. The incidence of decay is significantly related to tree age. Hemlock and spruce less than about 100 years of age are generally sound. Older hemlock deteriorates at a faster rate than Sitka spruce. Based on research by James Kimmey, for Sitka spruce in age class 151 to 200, defect was 5 percent, while in hemlock it was 16 percent (Farr, 1976). At 300 to 400 years of age, spruce is relatively rot free, whereas decay in hemlock averages 30-40 percent on a board-foot basis (Farr, 1976). Research by Kimmey (1956) also indicates that volume losses are small in young trees.

As for forest insects, trends in population are generally linked to weather conditions as opposed to forest management practices. The annual pest survey will help to identify where mortality has most recently occurred so that trees could be harvested before they decay. Only 109 acres were mapped on the Tongass National Forest in 2000. Only two acres of spruce beetle and 80 acres of hemlock canker mortality occurred on the Tongass in 2001.

In general, current management reduces the incidence and severity of insect and disease occurrence by removing infected trees through timber harvest. Even-aged vegetation management (clearcutting, seed tree or shelterwood regeneration methods) removes defective trees with fungal infections or those with mistletoe. The Forest Plan estimated that approximately 80 percent of future harvests would use the even-aged system. Past management has been above this level. The young growth that results after an even-aged harvest is vigorous and usually decay-free.

Action Plan:

The most important diseases and natural declines on the Tongass National Forest in 2001 were wood decay of live trees, hemlock dwarf mistletoe, and yellow-cedar decline. Heart and butt rot fungi cause substantial decay in late seral spruce-hemlock forests. No serious insect or disease in young-growth stands was detected through monitoring efforts. The monitoring work conducted annually by the State and Private Forestry branch of the Forest Service, Forest Health Group and the Forest Silvicultural staff is adequate.

Monitoring and inventorying insect and disease organisms takes place through efforts of the Forest Service State and Private Forestry, Research, and the National Forest System. Before a harvest prescription is developed, Tongass silvicultural staff survey insect and disease conditions. Following harvest, on-the-ground inspections are conducted to monitor stand development. At a minimum, inspections occur 3 to 5 years after harvest and again 12 to 20 years after harvest. These inspections include identifying insect and disease conditions and treatment needs to improve forest health.

Currently, the Forest Service is exploring alternatives to clearcutting where portions of the stand, either as single trees or groups of trees, are left as legacy (residual) trees. Questions have been raised as to whether increased blowdown and increased insect and disease damage will occur due to bole wounding of residual trees and/or retention of mistletoe and other infestations within the stand. These questions will be studied in a series of three research installations across the Tongass National Forest. Results of these studies will not be available for three to five years.

The arthropod diversity (mostly insects and arachnids) in old-growth stands (Polk Inlet, POW) compared to second growth stands (Maybeso Experimental Forest, POW) is now being determined, and the results will be available in about a year.

Goal 2: Multiple Benefits to People

Provide a variety of uses, values, products and services for present and future generations by managing within the capability of sustainable ecosystems.

Objective 2.a—Improve the capability of the Nation's forests and grasslands to provide diverse, high-quality outdoor recreation opportunities.

Objective 2.b—Improve the capability of wilderness and protected areas to sustain a desired range of benefits and values.

Objective 2.c—Improve the capability of the Nation's forests and grasslands to provide desired sustainable levels of uses, values, products, and services.

Objective 2.d—Increase accessibility to a diversity of people and members of underserved and low-income populations to the full range of uses, values, products, and services

Objective 2.e—Improve delivery of services to urban communities.

The Tongass achieved these objectives through monitoring several issues that overlap some of the various objectives. The monitoring completed to accomplish the objective is listed respectively. Detailed summary evaluation and action plan associated with the monitoring issues will be summarized under only one objective.

Objective 2.a

Objective 2.a—Improve the capability of the Nation's forests and grasslands to provide diverse, high-quality outdoor recreation opportunities.

In reference to Objective 2.a, the monitoring completed on recreation and tourism, and wild and scenic rivers describe the status of the Tongass relative to multiple benefits to people. Significant issues addressed in the monitoring this year included:

- Management of the Tongass relative to the prescribed Recreation Opportunity Spectrum classes

- Implementation of Wild, Scenic, and Recreational River standards and guidelines
- Effectiveness of Wild, Scenic, and Recreational River standards and guidelines

Recreation, Wild and Scenic Rivers

Recreation Opportunity Spectrum

Evaluation:

Recreation monitoring of the Tongass showed that generally areas are being managed in accordance with the Recreation Opportunity Spectrum (ROS) classes as described in the Forest Plan standards and guidelines. The monitoring primarily focused on sites of existing recreation facilities and areas of traditional high-use, although some monitoring of remote sites was accomplished. The outfitter/guide special use permit records along with records of guiding activity helped to define the high commercial use areas. Monitoring was also completed during the course of completing condition surveys for trails and developed recreation facilities, and completion of assessments for environmental documents.

Monitoring use at cabins and other developed recreation sites indicates that the typical visitor experience is within the social, physical and managerial setting described in the ROS classes.

Action Plan:

The recreation monitoring and refinement of the Recreation Opportunity Spectrum (ROS) classes will continue. The monitoring will continue to primarily focus on sites of existing recreation facilities and areas of traditional high-use although some monitoring of remote sites is also planned. Emphasis will be placed on monitoring sites where potential conflicts with users or ROS were reported and monitoring needs were identified. The outfitter/guide special use permit records along with records of guiding activity will continue to be used to define the high commercial use areas. Monitoring will also be completed during the course of completing condition surveys for trails and developed recreation facilities, and completion of assessments for environmental documents. Changes in ROS will be evaluated relative to land use designations and NEPA.

Wild and Scenic Rivers

Evaluation:

Monitoring completed on the Tongass showed that the standards and guidelines are being implemented and are effective in maintaining the free flowing conditions and outstanding remarkable values for eligible rivers. Monitoring activities included monitoring visitor use, outfitter/guide use, compliance of a recreation project within a river corridor, and analyzing projected effects from a proposed timber harvest. This monitoring showed that existing use on the Hasselborg, King Salmon, Kegan, Essowah Rivers and Anan Creek are within the allowable standards and guidelines of recreational outstanding remarkable features and are being effectively managed. Detailed information was collected in monitoring the Anan Creek Bear Observatory specific to public viewing, outfitter/guide use and bear behavior. Monitoring of this site shows that the recreational use is consistent with the anticipated use in the *Anan Management Standards Environmental Assessment*.

Action Plan:

Monitoring of the standards and guidelines relative to implementation and effectiveness in maintaining the free flowing conditions and outstanding remarkable values for eligible rivers will continue. Monitoring activities will continue to include monitoring visitor use, outfitter/guide use, compliance of recreation projects within river corridors, and analyzing projected effects from proposed timber harvest. Detailed information will continue to be collected in monitoring the Anan Creek Bear Observatory specific to public viewing, outfitter/guide use and bear behavior. Monitoring of this site will provide information to evaluate the recreational use consistency with the anticipated use in the *Anan Management Standards Environmental Assessment*. Ongoing NEPA work is anticipated to continue to addresses effects on the recommended wild, scenic and recreational rivers.

Objective 2.b

Objective 2.b—Improve the capability of wilderness and protected areas to sustain a desired range of benefits and values.

In reference to Objective 2.b, the monitoring completed on wilderness describes the status of the Tongass relative to multiple benefits to people. Significant issues addressed in the monitoring this year included:

- Implementation of Wilderness standards and guidelines
- Effectiveness of Wilderness standards and guidelines

Wilderness

Wilderness Implementation and Effectiveness

Evaluation:

Monitoring showed that standards and guidelines for Wilderness are generally being implemented and are effective. Specific monitoring activities were conducted on the Admiralty National Monument/ Kootznoowoo Wilderness, Tracy Arm-Ford's Terror Wilderness, Chuck River Wilderness, Misty Fiords Wilderness, and Stikine-LeConte Wilderness. This monitoring employed various methodologies and used regular program funds. An ecosystem approach used on the Misty Fiords Wilderness provided a collection of broad-scale observational data that can be used to identify resource related trends and concerns in many locations. Monitoring of the standards and guidelines is supported through repeated observation and documentation. Baseline inventory data is essential to monitor standards and guidelines.

Results indicate monitoring is essential to provide information on the status of wilderness management relative to standards and guidelines. Information on several heritage sites was collected during the monitoring effort. Compliance of outfitter/guides operating in the wilderness to the standards and guidelines is required by permit. Implementation and effectiveness of these standards and guidelines was confirmed through monitoring. We completed some plant inventory documentation of threatened, endangered and sensitive plants as well as non-native plants. Specific emphasis needs to be placed on collecting baseline inventory data on threatened, endangered and sensitive plants as well as non-native plants in wilderness areas. Monitoring also highlighted the need for cabin and trail maintenance on some of the districts. Concerns on levels of use, noise and visual impacts that affect the wilderness solitude were identified in some specific areas. Additional monitoring is needed to quantify use levels and associated mitigation measures should be developed as needed. Noise impacts reported on the Admiralty National Monument, Juneau Ranger District and Ketchikan-Misty Ranger District were caused by motorized boat and air traffic outside the jurisdiction of the Forest Service. These impacts affect the solitude, remoteness, and sense of isolation of the wilderness.

Action Plan:

Monitoring the implementation of standards and guidelines for wilderness will be continued. Monitoring of standards and guidelines is supported through repeated observation and documentation using standard protocols and scientific methods. Application of monitoring protocols and further refinement of the standards will continue. Emphasis will be placed on collecting baseline inventory data. Focus of this information collection will be to fill data gaps such as the threatened, endangered and sensitive plant inventory in some wilderness areas. Additional focus will be placed on monitoring levels of use and quantifying the monitoring data. Conflicts associated with the wilderness objectives of solitude and primitive recreation and aircraft overflights, boat traffic, and dock construction will continue to be addressed through interagency collaborative planning, where possible.

Objective 2.c

Objective 2.c—Improve the capability of the Nation's forests and grasslands to provide desired sustainable levels of uses, values, products, and services.

In reference to Objective 2.c, the monitoring completed on heritage resources, land management planning, local and regional economies, recreation and tourism, scenery, subsistence, timber, wild and

scenic rivers, wilderness, and cost and outputs describe the status of the Tongass relative to multiple benefits to people. Significant issues addressed in the monitoring this year included:

- Implementation of heritage resource standards and guidelines
- Effectiveness of heritage resource standards and guidelines in protecting resources
- Consistency of land management planning with management objectives of adjacent lands (discussed in Objective 2.d.).
- Effects on employment and income (discussed in Objective 2.d.)
- Management of the Tongass relative to the prescribed Recreation Opportunity Spectrum classes (discussed in Objective 2a.)
- Effectiveness of attaining the Visual Quality Objectives
- Consistency in effects of forest management relative to subsistence users with anticipated effects
- Implementation of timber harvest standards and guidelines
- Restocking of harvested Forest lands five years following harvest
- Consistency of Timber Allowable Sale Quantity
- Consistency of the non-Interchangeable Components (NIC) of the allowable sale quantity with actual harvest
- Proportional mix of timber volume in NIC I and NIC II relative to Forest Plan estimates
- Effectiveness of maximum size limits for timber harvest areas
- Implementation of Wild, Scenic, and Recreational River standards and guidelines (discussed in Objective 2.a.)
- Effectiveness of Wild, Scenic, and Recreational River standards and guidelines (discussed in Objective 2.a.)
- Implementation of Wilderness standards and guidelines (discussed in Objective 2.b.)
- Effectiveness of Wilderness standards and guidelines (discussed in Objective 2.b.)
- Outputs produced by the Tongass (discussed in Objective 2.e.)

Heritage Resources

Heritage Implementation and Effectiveness

Evaluation:

Monitoring shows Forest Plan standards and guidelines are being implemented. Some of the monitoring work was completed through a Programmatic Agreement (PA) with the Advisory Council on Historic Preservation and the Alaska State Historic Preservation Officer. The PA formalizes our compliance with Section 106 of the NHPA and includes site and project monitoring standards. The PA expired September 30, 2000 and we are currently negotiating terms of a new PA that incorporates 1992 amendments to the NHPA (codified by new rules published at 36 CFR 800). One of the most notable regulatory changes is an enhanced role of Indian Tribes in the Section 106 consultation process.

In FY 2001, 60 evaluations were completed to determine if activities had the potential to affect heritage resources eligible to the National Register. The standard consultation procedures outlined in 36 CFR 800 were followed for six undertakings (ten percent of all reviewed projects) prior to the signing of a NEPA decision memo. For the remaining 54 projects, we followed modified consultation procedures outlined in the PA with the Alaska State Preservation Officer (SHPO) and the Advisory Council on Historic Preservation. Avoidance of adverse effects is the preferred mitigation option for heritage resources on the Tongass National Forest. During FY 2001, one project required mitigation other than avoidance.

Monitoring included condition assessment of heritage resources on 167 sites. Archaeologist noted accelerated erosion at 4 sites and evidence of vandalism at 13 sites. Damage resulting from Forest Service projects was observed at three sites. The remaining 147 monitored sites are in a state of natural

decomposition. Generally, the Tongass met our legal compliance requirements and completed heritage resource affects analysis prior to making a NEPA decision.

Public outreach and other enhancement activities are perhaps our best tools in protecting heritage resources for future generations. The Tongass National Forest has a strong public outreach program that advocates forest visitors take an active stewardship role. Passport In Time (PIT), a popular national program, offers the public opportunities to work with archaeologists on a variety of projects. Volunteers participated in several Tongass PIT projects during 2001, including several heritage resource site-monitoring projects.

Action Plan:

The USDA Forest Service - Alaska Region has developed heritage resource management procedures to efficiently and economically carry out its obligations under Sections 106 and 110 of the National Historic Preservation Act. These procedures are outlined in a programmatic agreement that is currently being revised. Archaeological inventory is prioritized by the likelihood of locating heritage resource sites. Archeological inventory for proposed activities will continue to be concentrated primarily in the high sensitivity zones. Post-project monitoring on roads and within other activity areas will continue to be accomplished to verify the assumptions of the sensitivity model and to determine whether heritage resources are present but not revealed by standard inventory techniques.

The Forest Service should continue heritage resource monitoring to ensure that Forest Plan standards and guidelines are continually met. In the past three years, we have made significant progress in implementing standard monitoring procedures and increasing the number and frequency of monitoring inspections. However, we have only inspected a few of the total number of heritage resource sites on the Tongass. Although the total number of damaged sites that have been stabilized are few, we are making efforts to repair damage. Funding and personnel limit additional stabilization and/or data recovery efforts. The monitoring questions are relevant and illicit information that is essential for monitoring Forest Plan objectives.

The Forest Plan standards and guidelines are being implemented and are effective in meeting resource objectives, i.e. site protection and preservation. There is a need, however, to continue heritage resource monitoring to ensure that the standards and guidelines are continually met. We have in the past four years made significant progress to develop standard monitoring procedures and increase the amount of monitoring inspections. However, we have inspected only a relatively few of the Tongass heritage resources.

The Tongass heritage program team has adopted the philosophy that site protection is best served through education and public outreach, fostering a fuller appreciation of the values embodied in the archaeological record and thus recruiting the public as active stewards of heritage resources. Delineating this philosophy, the forest's archeologists are increasingly working with public school students, contributing to the development of college curricula (through the University of Alaska SE and other institutions), and sharing new discoveries at community functions and at public facilities. Through programs such as Alaska Archaeology Month and Passport in Time archeologists have connected with thousands of Alaskans who now have a better appreciation of the value of heritage resources and our approach to their management.

A closer relationship between Native Americans and archaeologists in the management of heritage resources and conducting archaeological research is being developed. New regulations implementing the National Historic Preservation Act require much closer and sustained consultation at all levels of project planning. The ongoing process of repatriation and consultation under the Native American Graves Protection and Repatriation Act bring federal agencies and tribes into close contact. At the same time in Southeast Alaska, Sealaska Corporation is attempting to begin an active management program for it 85 historic and cemetery sites acquired through the historic and cemetery sites provisions of the Alaska Native Claims Settlement Act (ANCSA 14(h)(1)). Sealaska seeks to work with clans and tribes to develop plans to manage these sites and to influence the management of historic and archaeological sites on other lands (federal, state, private).

A significant step forward in management of heritage resources in Southeast Alaska would be to develop agreements for cooperative management of historic and archaeological site in the region. Working together, clans, tribes, corporations, and federal and state agencies could more effectively learn from and protect these important cultural places.

Scenery

Evaluation:

Forest Plan monitoring and evaluation criteria are used to determine the effectiveness of the Scenery standards and guidelines. The criteria are used to determine whether the standards and guidelines associated with the harvest unit size, type of silvicultural system used, amount of dispersal between units, and the overall percent of viewshed disturbed are generally adequate to meet the different visual quality objectives in different types of landscapes.

The Forest Plan directs that a representative set of viewsheds across the Tongass, which have been harvested during implementation of Forest Plan standards and guidelines, be selected for evaluation and monitoring. The Forest Plan specifies certain criteria for these viewsheds with regard to use areas or travel routes on the Visual Priority list. The Forest Plan recommends representing the different characteristic landscapes and different Visual Absorption Capability settings. Monitoring is also recommended to assess the effectiveness of alternatives to clear cutting management.

Monitoring and evaluation reporting is scheduled to occur 3 – 5 years following adoption of the Forest Plan and at approximately 5 year intervals thereafter. In FY 1999, extensive monitoring was undertaken on the Tongass to assess the adequacy of the scenery standards and guidelines in the Forest Plan. Four viewsheds were analyzed across the Tongass. The results were documented in the 1999 Forest Plan monitoring report. In FY 2000 and FY 2001, no formal effectiveness monitoring of Tongass development activities based on Forest Plan scenery monitoring protocols was completed.

Action Plan:

Since the adoption of the Forest Plan in 1997, very little harvest of planned timber sales has occurred, which used the Plan's new scenery standards and guidelines. Some small timber sales have been recently implemented which were planned using the current Forest Plan's standards and guidelines. These harvested areas will be the focus of future monitoring activities to determine if the results of this harvest can adequately address the Forest Plan monitoring question.

Monitoring of the effectiveness of the Scenery standards and guidelines relative to the harvest unit size, type of silvicultural system used, amount of dispersal between units, and the overall percent of viewshed disturbed are anticipated to continue. A representative set of viewsheds across the Tongass that have been harvested during implementation of Forest Plan standards and guidelines will be selected for evaluation and monitoring. Monitoring is anticipated to assess the effectiveness of alternatives to clear cutting management.

Subsistence

Evaluation:

The effects of management activities on subsistence users in rural Southeast Alaska communities have not been determined. Many of the projects are long term in nature and the results will not be available for several years.

The Alaska National Interest Lands Conservation Act (ANILCA, 1980) requires a priority for subsistence uses by rural residents on Federal public land in Alaska (Title VIII). Since 1990, the Federal Government has been managing resources for subsistence use on Federal public lands through the Federal Subsistence Board. In 1995, the Ninth Circuit Court of Appeals ruled that the existing scope of the subsistence program should be expanded to include"...*those navigable waters in which the United States has an interest by the virtue of the reserved water rights doctrine*." Subsistence management of these waters became effective in October 1999.

To date, this new responsibility has resulted in the development of investigative projects designed to evaluate the condition of fish stocks important to subsistence fisheries, Traditional Ecological Knowledge (TEK), and consistency of the various existing fish harvest regulations. In addition to working through another annual cycle of wildlife regulation proposals, the first cycle of subsistence fishing regulation proposals were evaluated and presented to the Southeast Regional Advisory Council.

All NEPA projects were analyzed for effects on subsistence resources and a subsistence determination was made.

Consultations with tribes and communications with community leaders took place in many forms. These included informal meetings, informal public open houses, two formal 810 hearings, national roadless area meetings, Fish and Game Advisory Board meetings, other organized group board meetings, and teleconferences.

TRUCS updates will be available over the next few years. New TRUCS maps and analysis will be completed when the new data is collected. The annual report from the Subsistence Regional Advisory Council (RAC) and the Federal Subsistence Board response to the RAC report are available from the Office of Subsistence.

A series of projects initiated in FY 2000 on the Tongass were continued in 2001, with additional new projects begun, in cooperation with the Alaska Department of Fish and Game, community governments, and tribal governments. Several other data collection efforts are on going and are in a variety of stages of analysis. Information concerning these data sets can be obtained from the appropriate Forest Service office. These data sets include: Tongass deer jawbone/teeth age data, Tongass leg bone/fat analysis data, Tongass deer pellet count mortality data, Petersburg Ranger District marten study, Petersburg Ranger District deer study, Petersburg Ranger District wolf study, and Thorne Bay Ranger District Heceta Island deer study.

Action Plan:

Recommendations follow to continue to evaluate the effects on subsistence users in rural Southeast Alaska communities and compare those effects with the estimates in the Forest Plan.

Implementation of the subsistence monitoring report template that was developed in FY 1999 will continue every two years. This template organizes and displays monitoring information to facilitate the description of the effects of management activities on subsistence users in different ways. The template will be used in 2002 to provide information for 2001 and 2002.

Continuation of the work in support of Federal responsibilities in managing subsistence on public lands and in navigable waters is anticipated. The effects on subsistence resources will be continue to be analyzed in NEPA documents and subsistence determinations will be made on these activities. An in-depth update will occur for all subsistence fish and wildlife activities in 2002 Monitoring Report.

Timber

Timber Implementation

Evaluation:

Timber monitoring for implementation focuses on the limitation of created openings greater than 100 acres and the 1000 feet beach and estuary buffer requirement. Implementation of the Best Management Practices related to timber is discussed in the soil and water, fish habitat, karst and caves, and wetlands sections.

Monitoring showed that 2,026 acres were fully or partially harvested (930 acres of which resulted in the creation of an opening) in FY 2001. No created openings exceeded 100 acres in size. There were no stands harvested during 2001 that fell within the 1,000-foot beach and estuary zone. The timber harvesting activities were shown to be adhering to the standards and guidelines.

Action Plan:

The timber harvesting activities were shown to be adhering to the standards and guidelines consistently over the past and in the present. Timber monitoring for timber implementation is recommended to continue to focus on the limitation of created openings greater than 100 acres and the 1,000-foot beach and estuary buffer requirement. Continued application of the GIS system to identify and describe the harvest units relative to size, location and beach buffers is recommended.

Timber Restocking

Evaluation:

Monitoring has shown that achieving regeneration that meets the stocking guidelines and certification standards identified in the Silvicultural Practices Handbook (FSH 2409.17) is rarely a problem on stands receiving a regeneration harvest on the Tongass National Forest. Certain specific site conditions and opportunities indicate a need for artificial regeneration.

All harvested lands are examined following treatment. Artificially seeded or planted areas are examined one and three years after treatment. Examination occurs three growing-seasons after treatment in areas where it is anticipated that natural regeneration will be adequate. Stands are certified as stocked, if the third growing-season survey indicates that the areas meet stocking standards. Artificial regeneration is prescribed if the third-year survey indicates that natural regeneration is highly unlikely. During FY 2001, 4,551 acres were examined to determine the condition of the regeneration in harvest areas. Based on the Silviculture Information System (SIS), all timber harvest that occurred prior to FY 1996 is adequately stocked.

Action Plan:

The silviculture staff on the Tongass monitors the status of all regeneration harvests as required by the 1976 National Forest Management Act (NFMA). NFMA requires lands will be harvested only where they can be adequately restocked within five years. While we do not expect future regeneration problems (Southeast Alaska has excellent climatic conditions for reestablishing tree cover after disturbance), it is worthwhile to continue our field surveys and data base tracking. The preparation of this annual monitoring report serves as a good way for the public to be assured we are meeting the NFMA and forest-wide standard and guideline requirements.

Timber Allowable Sale Quantity

Evaluation:

Monitoring showed the Allowable Sale Quantity (ASQ) is consistent with resource information and programmed harvest. The ASQ is an upper ceiling governing the amount of timber that may be sold over a decade. The amount of sold timber may vary year to year but must not exceed the decadal ceiling. Timber is considered sold when the contract is awarded to the high bidder.

Examining the amount of timber sold during fiscal years 1997 through 2001, and comparing the total to the average annual amount of the ASQ, the timber volume sold was consistently lower than the annual ASQ. The timber volume sold ranged from 9 percent to 91 percent of the ASQ over the years from 1997-2001. The measure of the allowable sale quantity is the timber volume sold, not the amount advertised or harvested per year. Timber sales sold during one year are typically harvested over several years. Comparing the harvest totals for the Tongass National Forest for fiscal years 1990 through 2001 to the ASQ illustrates the difference between timber sold and harvest totals. The timber tables display that current timber harvest and timber sold levels are not at or near the 1997 Forest Plan ASQ ceiling. The effects of timber harvest are below the amount analyzed in the Forest Plan. Therefore, with implementation of land use designation prescriptions, Forest Plan standards and guidelines, and Best Management Practices, the allowable sale quantity is consistent with resource information and is under programmed timber harvest.

Action Plan:

Congress sets the programmed harvest with the development of the budget formulation process each fiscal year. Each district office submits a “bottom up” request for funding to cover the anticipated harvest offer preparation plan that they develop. If the programmed harvest budget is more or less than that developed on the district, the amount of funding can be requested or returned to coincide with the estimated output. As displayed in Table 2-28, “Tongass National Forest Timber Sold By Fiscal Year”, the amount of timber sold is below the ASQ set in the Forest Plan. This low volume per year sold is probably due to two factors. One is the continuing litigation on planned or existing sales, and the other is the low market demand. One or both factors could change in future years. Field inventory resource information is developed as timber sale proposals are developed through the planning process. Therefore, there are adequate accuracy checks to maintain a long-term sustained yield timber program within Forest Plan standards and guidelines to protect resources.

The ASQ is consistent with resources and programmed harvest as long as the suitable timber land base is maintained. Major decreases in the suitable timber land base can create inconsistencies in the balance between the ASQ and programmed timber harvest.

No action is necessary at this time in changing the monitoring process. We plan to continue to monitor the level of programmed harvest.

Timber Non-Interchangeable Components

Evaluation:

Monitoring shows the Non-Interchangeable Components (NIC) of the allowable sale quantity (ASQ) are not always consistent with actual harvest. The purpose of partitioning the ASQ into two separate components is to maintain the economic sustainability of the timber resource by preventing over-harvest of the most economic timber stands. The Forest Plan sets the proportional mix of timber harvest volume for the NIC I and NIC II categories. The proportional mix in the Forest Plan is set at approximately 80 percent NIC I and 20 percent NIC II (Forest Plan ROD, page 8). This represents a higher reliance on the NIC II component than that found in the 1979 TLMP. The partitioning of the ASQ also serves to identify that portion of the timber supply that is at risk of attainment because of marginal economic conditions. The NIC I component includes land that can be harvested using normal economic logging systems, with normal being defined as standard logging systems such as shovel and short span cable. The NIC II component includes land with high logging costs that are typically economically and technologically marginal. The NIC II component includes difficult and isolated operable timber stands requiring special logging equipment requirements due to yarding distances or topography (such as the use of long-span cable, multi-span cable and helicopter).

Table 3-2 shows that the percentage of NIC I and NIC II was relatively close to the proportional mix percent approximated in the Forest Plan until 2001. There appears to be an upward trend in the proportion of the NIC II harvest component. This trend may continue as the Tongass implements more timber NEPA decisions.

Table 3-2. Comparison of NIC I and NIC II Harvest By Fiscal Year, Based on Percent of Total Harvest

Fiscal Year	NIC I Percent of Harvest	NIC II Percent of Harvest
1997*	No Data Collected	No Data Collected
1998	95 percent (estimated)	5 percent (estimated)
1999	88 percent	12 percent
2000	77 percent	23 percent
2001	46 percent	54 percent

*The 1997 Forest Plan Monitoring and Evaluation Report did not analyze the NIC I and NIC II timber harvest categories.

As mentioned in Chapter 2, the 100 percent helicopter Kuakan Timber Sale on Deer Island accounted for most of the 2001 NIC II volume and accounted for the high percentage of NIC II in 2001.

It is too early to distinguish if the proportional mix of non-interchangeable components is estimated accurately. Not enough data has been collected and analyzed to date to make this determination. There seems to be an upward trend in the proportion of NIC II lands harvested. This trend may be partly due to resource protection needs and respectively addressing this mitigation through helicopter logging, which contributes to increase the NIC II harvest proportion. In these situations, helicopter logging is used although other cable systems may be capable of achieving the same objectives. The timber commodity market has been improving since the low Pacific Rim market experienced in 1998. The execution of timber sale contracts during the low market period was held and timber not harvested in speculation of market improvement.

If the proportional mix in NIC I and NIC II is not accurately estimated in the Forest Plan, it will contribute to higher harvest operating costs. Forest Service interdisciplinary teams planning timber sales need to weigh the costs and revenues of adding NIC II lands to increase timber volume prior to the NIC I proportion of the ASQ being satisfied.

Action Plan:

All timber sale harvest units that were completed during FY 2001 were categorized into non-interchangeable components using the Forest Plan operability layer in the geographic information system (GIS). Utilization of this GIS system is recommended to continue, and further revision of the process used to track NIC I and II is ongoing.

As long as the amount of timber offered is below the NIC I amount of the ASQ (219 MMBF/year average), it does not really matter what portion of NIC II is offered, since in theory it would only be offered after the NIC I proportion is satisfied. As depicted in the tables, a substantial amount of NIC II lands are included in timber offerings prior to the NIC I proportion being satisfied. This will help insure that the more economic land base is not over harvested. Conversely, the NIC II inclusion with timber offerings prior to the NIC I component being satisfied decreases the economics of the timber offerings as a whole.

As stated above, not enough data has been collected and analyzed to date to determine if the proportional mix of non-interchangeable components is estimated accurately. If the proportional mix in NIC I and NIC II is not accurately estimated in the Forest Plan, it will contribute to higher harvest operating costs. Currently, maps generated from GIS show which areas are NIC I or NIC II. Higher harvest operating costs could limit the ability of purchasers to compete for a timber supply from the Tongass National Forest. Higher costs could ultimately drive timber purchasers and manufacturing facilities out of business, if the timber commodity prices do not increase proportionately. It may be likely to see higher operating costs generated on Tongass National Forest timber sales with the implementation of the Forest Plan. Forest Service interdisciplinary teams that plan timber sales need to weigh the costs and revenues of adding NIC II lands to increase timber volume prior to the NIC I proportion of the ASQ being satisfied. No action is recommended at this time. Continued monitoring is necessary to evaluate the proportional mix of harvest from NIC I and NIC II category lands.

No action is necessary at this time in the monitoring process or proportional mix of NIC I and II. Recommendations follow to continue to monitor the trend of harvest from NIC II lands.

Timber Maximum Harvest Unit Size

Evaluation:

Monitoring indicates there is no need to pursue change in the maximum opening size or the factors for approving openings greater than 100 acres. The NFMA regulations established 100 acres as the maximum size for created openings using the even-aged system (clearcutting, seed tree, and shelterwood) within the western-hemlock/Sitka spruce forest type of coastal Alaska. The Forest Supervisor and the Regional Forester can approve openings up to 150 and 200 acres, respectively, in situations defined in the Forest Plan's forest-wide standards and guidelines.

During this fiscal year, 65 timber stands were delineated in GIS and the SIS database. Taking adjacency into account (harvested stands that touch one another, which create a larger opening when added together), 32 harvest areas were logged in FY 2001 that created openings using the even-aged

silvicultural system. No openings created exceeded 100 acres in size. The 32 openings averaged 29 acres, and ranged from 2 to 82 acres in size.

Trends in harvest opening size have been toward smaller openings and less reliance on the even-aged silvicultural system. Forest Plan standards and guidelines for scenery, sensitive species such as Northern goshawk and American marten, and soil and water Best Management Practices (BMPs) emphasize smaller sizes. Emphasis on leaving old-growth structure in harvest areas is also resulting in breaking up the once large harvest size. In addition to the 32 units discussed above, 39 units were harvested using either uneven-aged or two-aged systems or were salvage harvested. Totaling 1,096 acres, these harvest units ranged in size from 1 acre to 136 acres.

Action Plan:

The Tongass demonstrated effective management for compliance with criteria for the maximum opening size and criteria for approving openings larger than 100 acres. Continuation of the present implementation and monitoring is recommended. Opening size for a number of years has continued to decline. This is a result of increased consideration for riparian, visual, wildlife, fish and other resources. When size limits are occasionally exceeded, it is done only after analysis and line officer approval in an EIS or EA and subsequently issued decision document. Continued application of the GIS and SIS databases for tracking and analysis of openings is recommended. The preparation of this report question serves as a good way for the Public to be assured we are meeting opening size requirement.

Objective 2.d

Objective 2.d—Increase accessibility to a diversity of people and members of underserved and low-income populations to the full range of uses, values, products, and services

In reference to Objective 2.d, the monitoring completed on land management planning, local and regional economies, recreation and tourism, and subsistence describe the status of the Tongass relative to multiple benefits to people. Significant issues addressed in the monitoring this year included:

- Consistency of land management planning with management objectives of adjacent lands
- Effects on employment and income
- Management of Tongass relative to the prescribed Recreation Opportunity Spectrum classes (discussed in Objective 2.a.)
- Consistency in effects of Forest Management relative to subsistence users with anticipated effects (discussed in Objective 2.c.)
- Implementation of Wild, Scenic, and Recreational River standards and guidelines (discussed in Objective 2.a.)
- Effectiveness of Wild, Scenic, and Recreational River standards and guidelines (discussed in Objective 2.a.)
- Implementation of Wilderness standards and guidelines (discussed in Objective 2.b.)
- Effectiveness of Wilderness standards and guidelines (discussed in Objective 2.b.)

Land Management Planning

Evaluation:

Management of National Forest System lands is consistent with management objectives of adjacent lands and their management plans in FY 2001. Efforts of the Forest Service to improve government-to-government relationships as well as collaborative, community-based resource stewardship contributed to achieve compatibility of Forest Service management activities with the goals and objectives of adjacent lands. The trend of consistency has been documented over the past three years.

National Forest Management projects with decisions completed in FY 2001 were evaluated to determine if any non-National Forest lands existed adjacent to project locations. Projects that have been appealed, and decisions remanded during FY 2001 were not evaluated. The projects identified as having adjacent non-National Forest system lands (adjacent is defines as within a distance that could possibly be influenced by Forest management) include the following projects listed by ranger district:

- Ketchikan-Misty Ranger District: Harriet Hunt Firewood Sale
- Petersburg Ranger District: Woodpecker Project Area Record of Decision
- Thorne Bay Ranger District: Cedar Decline 2000, and the FY 2001 Precommercial Thinning Project
- Wrangell Ranger District: Continued Special Use Authorizations for Sixteen Isolated, Research and pre-ANILCA Cabins

Action Plan:

Continuation of the Tongass efforts to improve government-to-government relationships as well as collaborative, community-based resource stewardship is essential to achieve compatibility of Forest Service management activities with the goals and objectives of adjacent lands. Monitoring of the effects of the Tongass National Forest management on lands, resources, and communities adjacent to or near Tongass projects will continue. Effects upon Forest lands from adjacent land activities managed by other government agencies and under the jurisdiction of local governments will also be monitored.

Local and Regional Economics

Employment and Income

Evaluation:

Monitoring of the effects on employment and income from Tongass management relative to Forest Plan estimates is inconclusive at this time. Additional data collection and evaluation is necessary to quantify and qualify the effect. The Tongass comprises about 90 percent of Southeast Alaska's land base, and the 33 communities within Southeast Alaska are dependent upon the forest resources for economic opportunities, quality of life, traditions and cultures, and recreational activities.

Annual monitoring data used for this evaluation are from the Alaska Department of Labor, and these results are compared against the estimates in the Forest Plan. The employment data in the Forest Plan was estimated for the Allowable Sale Quantity (ASQ) harvest and the Non-Interchangeable Component I (NIC I) harvest. The Southeast Alaska Employment and Earnings, Annual Equivalent [Non-agriculture Wage and Salary (NAWS)] Employment and Earnings reports use slightly different categories than those listed in the Forest Plan. These differences are in the recreation/tourism and salmon harvesting categories. The jobs associated with the wood products reported in NAWS are generally consistent with the Forest Plan estimates. The total number of jobs in Southeast Alaska reported in NAWS is lower than the estimate in the Forest Plan. There are some disparities between the jobs reported for the Retail and Services reported in the NAWS and the estimates in the Forest Plan for Recreation and Tourism as well as in Mining. The Forest Plan estimates for jobs in these categories were significantly higher than the NAWS report. The earnings data for 2001 are not available. The earnings levels in the past reported in NAWS have been higher for wood products and recreation/tourism than the Forest Plan estimates. The earnings levels for mining reported in NAWS have been lower than the estimates in the Forest Plan. Most of these differences can be partially attributed to the difference in the category definitions (i.e. employment groups and self employed persons), the assumption in the Forest Plan estimates of full implementation, and modeling used in the Forest Plan.

Action Plan:

Continued monitoring and evaluation of the effects on employment and income from Tongass Management is underway. Clarification and segregation of the category definitions is necessary to compare the Southeast Alaska Employment and Earnings, Annual Equivalent [Non-agriculture Wage and Salary (NAWS)] Employment and Earnings reports and the employment and income estimates in the Forest Plan. Compensation for less than full implementation in the employment categories needs to be

made to the Forest Plan estimates. Re-evaluation and updating of the assumptions and criteria for the Forest Plan model utilized to determine projected employment and income levels is recommended.

Objective 2.e

Objective 2.e—Improve delivery of services to urban communities.

In reference to Objective 2.e, the monitoring completed on heritage resources, land management planning, local and regional economies, recreation and tourism, scenery, subsistence, timber, wild and scenic rivers, wilderness, and cost and outputs describe the status of the Tongass relative to multiple benefits to people. Significant issues addressed in the monitoring this year included:

- Consistency of land management planning with management objectives of adjacent lands (discussed in Objective 2.d.)
- Effects on employment and income (discussed in Objective 2.d.)
- Management of the Tongass relative to the prescribed Recreation Opportunity Spectrum classes (discussed in Objective 2.a.)
- Outputs produced by the Tongass

Costs and Outputs

Evaluation:

Reviewing the results of the monitoring of the outputs and associated costs for these outputs, there were significant accomplishments of targets for the funds spent in FY 2001. From the data collected and monitoring evaluation completed, it is not possible to distinctly discern if the costs associated with carrying out the planned management prescriptions are consistent with the costs estimated in the Forest Plan. Many of the activities planned for completion in FY 2001 were not fully completed due to personnel shortages in key areas, lateness in getting definite carryover funds, and a late final budget.

Targets were achieved or surpassed in about two thirds of the items listed in Chapter 2 for Costs and Outputs. Some of the Ecosystem Management targets were not achieved. Reasons for this include not receiving digitized geology maps and a TERRA model not in place. Scheduling difficulties also caused problems. Most of the recreation, wilderness, and heritage goals were achieved. All the fisheries goals were achieved. Most of the remaining goals shown on this page were also achieved.

The allocation and expenditure amounts were obtained from the preliminary September 2001 fund control report and information submitted to the Regional Office for missed end of year obligations. At the time of this monitoring evaluation, the final FY 2001 reports were not available and some of the fiscal obligations had not been processed so the expenditures can only be considered estimates. Comparison of the allocations and expenditures for this fiscal year shows that overall the Tongass spent only approximately 77 percent of the funds allocated by EBLI and 81 percent of the KV funds allocated according to preliminary figures prior to processing of some of the fiscal obligations. Projections indicate that the Tongass will probably have spent less than the allocation in FY 2001 but the expenditure will probably be relative to the work and associated target completion.

Action Plan:

Continued monitoring of the costs and outputs is recommended. Additional data needs to be collected to discern if the costs associated with carrying out the planned management prescriptions are consistent with the Forest Plan estimates. Earlier distribution of allocation information should contribute to help the resource groups plan resource management activities and effectively use the allocations to complete work and associated targets.

Goal 3: Scientific and Technical Assistance

Develop and use the best scientific information available to deliver technical and community assistance and to support ecological, economic, and social sustainability.

Objective 3.a—Better assist in building the capacity of Tribal governments, rural communities, and private landowners to adapt to economic, environmental, and social change related to natural resources.

Objective 3.b—Increase the effectiveness of scientific, developmental, and technical information delivered to domestic and international interests.

Objective 3.c—Improve the knowledge base provided through research, inventory, and monitoring to enhance scientific understanding of ecosystems, including human uses, and to support decision making and sustainable management of the Nation's forests and grasslands.

Objective 3.d—Broaden the participation of less traditional research groups in research and technical assistance programs.

Objective 3.a

Objective 3.a—Better assist in building the capacity of Tribal governments, rural communities, and private landowners to adapt to economic, environmental, and social change related to natural resources.

In reference to Objective 3.a, the monitoring completed on local and regional economies describes the Forest's efforts to use the best scientific information available to deliver technical and community assistance. The significant issue addressed in the monitoring this year was:

- Work completed by the Forest Service with local communities to identify and pursue Rural Community Assistance Opportunities

Local and Regional Economics

Rural Community Assistance Program

Evaluation:

Monitoring completed in FY 2001 shows the Forest Service has worked with local communities to identify and pursue Rural Community Assistance Opportunities. The Rural Community Assistance (RCA) Program is a Forest Service program that directly includes the Economic Recovery Program (ERP) and the Rural Development (RD) program. The RCA program indirectly includes participation in the Southeast Alaska Community Economic Revitalization Team (SEA-CERT). The Economic Recovery Program has grants that are available to (a) organize a community action team, (b) develop a community action plan, and (c) implement projects from the community action plan. Grants are competitive and contingent on annual appropriations. The Rural Development Program provides seed money for community projects statewide that will produce long-term jobs in the communities. SEA-CERT is a federal-state partnership organized to help communities maintain, strengthen, or diversify their economies by providing improved access to technical, permitting, and financial assistance.

The Tongass has participated in the ERP program by notifying rural communities of the program and responded to requests for assistance from communities through a competitive grants program. The Forest Service participates in the Rural Development Program through a cooperative agreement with the State of Alaska to provide this funding through the State's Community Development Block Grant (CDBG) mini-grant program. The program provides seed money for community projects statewide that will produce long-term jobs in the communities. The Tongass Forest Supervisor shares the Federal Co-chair seat of SEA-CERT with the State Director of USDA Rural Development. The Tongass RCA coordinators provide staff support to the SEA-CERT.

Positive contributions were noted in the community level effects of the RCA program in 30 of the 35 communities and the Southeast Conference. Specific contributions were reported in the Economic Recovery Program and Rural Development Program. Although the SEA-CERT program was largely inactive this year, we continue to see the positive effects of improved communication, coordination, and

collaboration between State and Federal agencies on behalf of participating communities. The forest staff readily works with communities who desire assistance. Some districts have increased collaborative stewardship efforts that often lead to identification and pursuit of RCA opportunities. Monitoring levels are fully adequate.

Action Plan:

Monitoring of the Rural Community Assistance Program is planned to continue in FY 2002. The Forest Service is continuing to work with the local communities to identify and pursue Rural Community Assistance Opportunities. The Rural Community Assistance (RCA) Program is continuing to include the Economic Recovery Program (ERP) and the Rural Development (RD) program. The RCA program will continue to indirectly include participation in the Southeast Alaska Community Economic Revitalization Team (SEA-CERT).

The Tongass will continue to participate in the ERP program by notifying rural communities of the program and respond to requests for assistance from communities through a competitive grants program. The Forest Service plans to continue to participate in the Rural Development Program to provide this funding through the State's Community Development Block Grant (CDBG) mini-grant program. The Tongass National Forest plans to continue to participate in SEA-CERT in cooperation with the State.

Objectives 3.b, 3.c and 3.d

Objective 3.b—Increase the effectiveness of scientific, developmental, and technical information delivered to domestic and international interests.

Objective 3.c—Improve the knowledge base provided through research, inventory, and monitoring to enhance scientific understanding of ecosystems, including human uses, and to support decision making and sustainable management of the Nation's forests and grasslands.

Objective 3.d—Broaden the participation of less traditional research groups in research and technical assistance programs.

In reference to Objective 3.b, 3.c, and 3.d, the monitoring completed on research describes the status of the Tongass relative to using the best scientific information available to deliver scientific and technical assistance. The significant issue addressed in the monitoring this year was:

- Research completed to fulfill high priority information needs.

Research

Evaluation:

Monitoring of research completed in cooperation with the Pacific Northwest (PNW) station shows that the high priority information needs of the Tongass are being addressed in various research projects. Priority research was identified in the Forest Plan for implementation of the plan in addition to further amendment and revision of the Plan. The research results will contribute to substantially strengthen the scientific information base needed to support alternative Forest Plan development. The research also contributes to the adaptive management feedback loop to evaluate the current Plan direction, design monitoring programs, and adjust future management to better address economic, social and environmental concerns.

This Tongass research is an innovative, knowledge-based partnership between research scientists and Tongass resource managers, and will help guide management. This partnership shows the role of scientific knowledge in some of the decision making on the Tongass. One research project, "The Effects of Silvicultural Treatments on Young Growth Wood Quality," was finished in 2001 and a preliminary report is available.

Specific progress was made as summarized on the following list of projects. Some preliminary results of this work have been used in implementation of the Forest Plan. None of these preliminary results have identified a need to revise the Forest Plan.

Project 1: Alternatives to Clearcutting (ATC)

Vegetation data was collected with a system of permanent sample plots. These measures include species, age, size, form, growth, microsite, and presence of damaging agents. Understory vascular plant cover and biomass were measured on these plots to characterize plant abundance, diversity, and deer forage availability. To characterize the pre- and post-harvest composition and density of forest birds, censuses were conducted during the nesting season.

We examined invertebrate (terrestrial and aquatic) and coarse detritus transport from forested headwaters to downstream aquatic habitats. Fifty-two small streams, representing a geographic range throughout Southeast Alaska, were sampled with 250-μm nets per 24-h intervals either seasonally (spring-summer-fall) or biweekly throughout the year. Sampling occurred in fishless reaches, in most cases upstream of salmonid-bearing habitats, to assess the potential energy subsidies fishless headwater streams make to downstream salmonid habitats.

An automated system of sensors and dataloggers was established to continuously record rainfall and groundwater accumulation and movement. These data will be used to determine the groundwater response to seasonal and individual-storm rainfall, both before and after treatment. Multiple years of pretreatment data were collected, allowing us to characterize baseline levels of year-to-year and seasonal variability.

Project 2: Alternative to Clearcutting (ATC) – Retrospective Study.

By examining a variety of partial cut stands, some as old as 90 years, through an interdisciplinary study, it is possible to determine the success of regeneration in comparison to old-growth stands.

Over 270 partial cut stands throughout Southeast Alaska were identified from 1995 to 1997. Of these, intensive studies were conducted on 18 stands harvested with ground-based logging systems and 12 stands harvested with helicopters. Tree increment cores and stem sections, along with comprehensive overstory and understory vegetation data, were used to ascertain stand histories and to describe their response to partial cutting. This work focused primarily on forest vegetation with some work on forest birds. The study showed that Sitka spruce can be maintained in mixed western hemlock-Sitka spruce stands over a wide range of cutting intensities. It also showed that partial cutting maintained stand structures similar to uncut old-growth stands and that cutting did not have significant effects on tree species composition. Concerns about changing tree species composition, lack of spruce regeneration, and greatly reduced stand growth and vigor with partial cuts were largely unsubstantiated. The species richness and community structure of understory plants were similar among uncut and partial cut plots. Several journal articles have been submitted or are in preparation as a result of this study.

Project 3: Alternatives to Clearcutting (ATC) --Social Acceptability of Alternative Forest Management Practices

This larger interdisciplinary study aims to evaluate the ecological, economic, operational, and social aspects of an array of timber harvesting techniques as alternatives to clearcutting old-growth forest stands in Southeast Alaska. This long-term project comprises the social acceptability component of the larger study.

A literature review was completed in FY 1999 and early FY 2000. Field researchers used photographs and preliminary findings from the larger Alternatives to Clearcutting project to frame structured interviews with Southeast Alaska residents. A final report was completed. Results were presented at the Society and Natural Resources Symposium in Bellingham in June 2000.

The resident survey component of this project was pre-tested and is ready to be administered pending OMB approval for a resident survey in Southeast Alaska.

Project 4: Density and Demography of Endemic Small Mammals

Fieldwork has been completed as proposed in the study plan. Information included in the FY 2001 completed reports includes: (1) the abundance of Wrangell Island red-backed vole and Keens mouse, and Prince of Wales flying squirrel, (2) age and sex distribution of grid samples for each species, and (3)

body condition and reproductive performance of each species. Additional work will include the microhabitat features associated with capture of individuals, and development of a habitat model.

Project 5: Salmon Habitat Monitoring

The emphasis of the past four years of work has been on collecting and analyzing data sampled from major geographic areas of Southeast Alaska. Single channel floodplain reaches were selected as the focus of the study to increase the probability of detecting differences (larger effect size), to increase the statistical power of the sample size, and to sample low-gradient depositional channels, where cumulative watershed effects are most likely to be measurable. Preliminary data analysis has been completed to determine the adequacy of the sample plan, test and verify sample methodologies, and to further develop hypotheses. In 2001, emphasis shifted to data analysis and interpretation. A reduced data collection program was maintained, involving resampling of eight pre-existing sites. In 2002, data analysis will be competed and draft results will be made available.

Project 6: Recreation and Tourism

Two studies are now in progress:

- *Macroeconomic analysis of structure and trends in recreation and tourism in Southeast Alaska*, a final draft of the tourism trends paper is now through review and should be available in the near future. Preliminary analysis of the data show that the cruise ship tourism industry tends to be the dominant tourism/recreation engine in the region. An apparent trend of growth is estimated around 7 to 10 percent annually; other tourism sectors show no or much slower growth.
- Using markets and economic instruments as management tools for recreation and tourism in Southeast Alaska. Research during FY 2001 included completion of fieldwork in Hoonah and Craig/Klawock using the same field methods as applied in Haines the previous year. Draft community reports for Haines and Hoonah are completed based on this research. Community reports included preliminary findings based on interviews conducted and review of secondary material. Findings identified differences both in the type and level of tourism in these communities and in the community's response to tourism. Aspects of this work were presented at a regional tourism symposium held in Juneau in the spring of 2001. Other progress involves gathering information on Forest Service recreation programs from Tongass staff, and developing familiarity with issues and tools related to user fees and other recreation pricing techniques.

Project 7: Timber Supply and Markets

In FY 2001, most of the work was devoted to completing projects begun in prior years. Two publications were released. One is entitled *Assessment of the Competitive Position of the Forest Product Sector in Southeast Alaska, 1985-94* PNW GTR 504, by Robertson. This document provides an analysis of the production costs and related issues for timber products in Southeast Alaska as compared to British Columbia and the Pacific Northwest. The second publication, *Alaska Softwood Market Price Arbitrage* PNW GTR xxx (in press) by Stevens and Brooks, formally tests the hypothesis that markets for Alaska lumber and logs are integrated with markets for similar products from the Pacific Northwest and British Columbia.

Project 8: Tourism/Recreation Economic Studies

Work in this area examines recreation and tourism as an economic sector and the impacts of tourism and recreation on local economies. This includes the analysis of visitor patterns and expenditures, job creation, structural shifts in economic composition, and community dependence on tourism. Other objectives include developing a description of the structure of the recreation/tourism sector; analysis of factors affecting both trends and structural change in the sector; and approaches to identifying the role of the Tongass National Forest in this sector.

One report was published as a PNW General Technical Review and another report will be included as part of a joint publication. FY 2001 saw the preparation of survey instrument components covering tourism issues to be part of a resident survey in Southeast Alaska (see Project 11 below). This survey will be administered as soon as funding can be secured to complete this task. Researchers have been active in interagency steering committee meetings in drafting and conducting surveys of (1) Southeast Alaskan outfitter-guides, (2) visitors to Southeast Alaska, and (3) Alaska resident in-state travel patterns and recreation use of public lands. One researcher has focused on identifying economic research questions related to the cruise ship industry and its relationship to and implication for Southeast Alaska regional and community dynamics and public lands management.

Community based tourism studies in three Southeast Alaska communities (Haines, Hoonah, and Craig/Klawock) began during FY 2001 (see Project 6). The research focused on each community's response to tourist activities and the changing use and definition of natural resources that result from these activities. Interviews with community members and tourism business operators were the basis of the field studies. Fieldwork has been completed in Hoonah and Craig/Klawock. A field report based on work in these communities will be forthcoming.

Two publications have been produced as a result of this study. One is entitled: *Tourism and natural resource management: a general overview of research and issues* by Jeffrey Kline PNW GTR 506. This study describes concepts of and provides a review of literature relevant to ecotourism and natural resource management. The second publication, *Tourism growth in Southeast Alaska: trends, projections and issues*, PNW GTR xxx by Schroeder, Cerveny and Robertson, discusses an economic based model to estimate the tourism component of Southeast Alaska's regional economy at the borough level.

Project 8A: Markets as Economic Instruments for Recreation/Tourism

Work was to begin in calendar year 2001 with the results from the outfitter/guide survey and a comprehensive literature review used to develop a study plan. As a result of employee movement, this study was deferred. In March 2001, the PNW Social and Economic Values researchers and the Alaska Regional Office hosted the *Forum on Recreation and Tourism Research in Alaska* symposium. This symposium was to provide an arena where professionals in the field of recreation and tourism could exchange ideas, data, research results and information needs. Another objective was to facilitate communication among researchers and between researchers and interested audiences.

Project 9: Subsistence Data Gathering and Analysis

Harvest assessments were completed for Petersburg, Saxman, Wrangell, and Yakutat. The Yakutat Native Association completed harvest assessment for Yakutat in early 2001. These field studies completed the multi-year harvest assessment project. The small communities of Elfin Cove, Gustavus, Hyder, Meyers Chuck, Pelican, Port Alexander, and Tenakee Springs have not been covered in this research effort. Household surveys have been conducted in 24 Southeast Alaska communities.

Harvest assessment data have been included in a statewide Community Profile Database maintained by the Alaska Department of Fish and Game. These data are Internet accessible. This marked the completion of a five-year study to update community level subsistence data in Southeast Alaska. Data will be reported in FY 2002 and analysis will examine the change in continuity in subsistence patterns in Southeast Alaska communities at both a community and a regional scale.

Project 10: Traditional Ecological Knowledge (TEK)

This project is to establish TEK studies in three Southeast Alaska Native communities per year, with work in each community to take place over a two-year period. In FY 2001, we began work with tribal governments in Angoon, Kake and Hoonah to develop TEK studies in each of these communities. Work with Hoonah and Kake is well underway, while Angoon is progressing slower due to changes in the tribal government in the community. Late in FY 2001, this project was initiated in Craig, Sitka and Yakutat, the next set of communities to be covered. Contemporary Tlingit and Haida communities are generally located within historic tribal territories, and tribe, clan, and house use of land and natural resources continues to have contemporary importance. Clan and tribal territories continue to be central features of Native worldview and to influence current Native land use. Findings are showing that less use has been

made of some traditional territories due to access restrictions, changes in resource use, and maintenance of fewer subsistence hunting, fishing and gathering camps.

Project 11: Social Characteristics of Southeast Alaska Communities, Impact of Forest Management, Southeast Alaska Residents Attitudes and Values.

This project is referred to in Project 3: Social Acceptability of Alternative Forest Management Practices. Most effort in this project has gone into development of the Southeast Alaska resident survey. In late FY 1999, work began with the University of Alaska, Anchorage, Institute for Social and Economic Research (ISER) to develop an appropriate survey instrument and methodology. Funding has since lapsed through UAA. The Office of Management and Budget did approve this survey in August 2001; however, funding to implement was not available in FY 2001. The Southeast Alaska Public Survey is intended to provide quantitative measures of Southeast Alaskan resident responses concerning: (1) uses of forest resources, (2) forest management, (3) tourism and recreation, (4) quality of life, (5) agency evaluation, (6) knowledge of forest planning, (7) subsistence, (8) future vision of the Tongass, and (9) social and economic studies.

Action Plan (for items 1 through 11 above):

Monitoring of research is planned to continue. This work is completed in cooperation with the Pacific Northwest (PNW) station to address high priority information needs of the Tongass. Priority research is intended for implementation of the Forest Plan as well as intended to contribute information for further amendment and revision of the Plan. The research results will contribute to substantially strengthen the scientific information base needed to support alternative plan development. The research will contribute to the adaptive management feedback loop for the Tongass. This feedback will contribute information to evaluate the current Plan direction, design monitoring programs, and adjust future management to better address economic, social and environmental concerns. Continued progress on the ongoing research projects is anticipated.

Goal 4: Effective Public Service

Ensure the acquisition and use of an appropriate corporate infrastructure to enable the efficient delivery of a variety of uses.

Objective 4.a—Improve financial management to achieve fiscal accountability.

Objective 4.b—Improve the safety and economy of USDA Forest Service roads, trails, facilities, and operations and provide greater security for the public and employees.

Objective 4.c—Improve and integrate informational systems, data structures, and information management processes to support cost-efficient program delivery.

Objective 4.d—Improve the skills, diversity, and productivity of the workforce.

Objective 4.e—Ensure equal opportunity in employment practices.

Objective 4.f—Provide appropriate access to National Forest System lands and ensure nondiscrimination in the delivery of all USDA Forest Service programs.

Objective 4.a.

Objective 4.a—Improve financial management to achieve fiscal accountability.

In reference to Objective 4a, the monitoring completed on costs and outputs describes the status of the Tongass relative to ensuring effective public service. The significant issue addressed in the monitoring this year was:

- Evaluation of the Costs and Outputs of the Tongass (discussed in Objective 2.e.)

Objectives 4.b and 4.f

Objective 4.b—Improve the safety and economy of USDA Forest Service roads, trails, facilities, and operations and provide greater security for the public and employees.

Objective 4.f—Provide appropriate access to National Forest System lands and ensure nondiscrimination in the delivery of all USDA Forest Service programs.

In reference to Objectives 4.b and 4.f, the monitoring completed on transportation and recreation describes the status of the Tongass relative to ensuring effective public service. Significant issues addressed in the monitoring this year included:

- Roads and log transfer facilities (discussed in Chapter 3 under Objective 1.a)
- Recreation and off road vehicle use (discussed in Chapter 3 under Objective 1.a)
- Management of the Tongass relative to the prescribed Recreation Opportunity Spectrum (discussed in Chapter 3 under Objective 2.a)

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Appendices

Appendix A

MONITORING QUESTIONS

MONITORING QUESTIONS

Air Quality

Is air quality meeting State and Federal ambient air quality standards?

Biodiversity

Are contiguous blocks of old growth habitat being maintained in a forest-wide system of old growth reserves to support viable and well distributed populations of old growth associated species and subspecies?

Are the effects on biodiversity consistent with those estimated in the Forest Plan?

Are management practices consistent with current knowledge regarding sensitive species conservation (federally listed threatened or endangered species, Alaska Region sensitive species, and State species of special concern)?

Are destructive insect and disease organisms increasing to potentially damaging levels following management activities?

Fish Habitat

Are population trends for Management Indicator Species (MIS) and their relationship to habitat changes consistent with expectations?

Are Fish and Riparian Standards and Guidelines being implemented?

Are Fish and Riparian Standards and Guidelines effective in maintaining or improving fish habitat?

Heritage Resources

Are Heritage Resources Standards and Guidelines being implemented?

Are Heritage Resources Standards and Guidelines effective in protecting heritage/cultural resources as expected in the Forest Plan?

Karst and Caves

Are Karst and Cave Standards and Guidelines being implemented?

Are Karst and Cave Standards and Guidelines effective in protecting the integrity of significant caves and the karst landscape?

Land Management Planning

Is the management of National Forest System lands consistent with management objectives of adjacent lands and their management plans?

Local and Regional Economies

Are the effects on employment and income similar to those estimated in the Forest Plan?

Has the Forest Service worked with local communities to identify and pursue Rural Community Assistance opportunities?

Minerals and Geology

Are the effects of mining activities similar to those estimated in the Forest Plan, as allowed in approved Plans of Operations?

Recreation and Tourism

Are areas of the Tongass being managed in accordance with the prescribed Recreation Opportunity Spectrum (ROS) class in Forest-wide Standards and Guidelines?

Is Off Road Vehicle (ORV) use causing, or will it cause, considerable adverse effects on soil, water, vegetation, fish and wildlife, visitors, or cultural and historic resources of the Tongass?

Research

Have identified high-priority information needs been fulfilled?

Scenery

Are the standards and guidelines effective in attaining the adopted Visual Quality Objectives established in the Forest Plan?

Soil and Water

Are the standards and guidelines for soil disturbance being implemented?

Are the standards and guidelines effective in meeting Alaska Regional Soil Quality Standards?

Are Best Management Practices (BMPs) being implemented?

Are Best Management Practices effective in meeting water quality standards?

Subsistence

Are the effects of management activities on subsistence users in rural Southeast Alaska communities consistent with those estimated in the Forest Plan?

Timber

Are timber harvest activities adhering to applicable Timber Management Standards and Guidelines?

Are harvested forest lands restocked within five years following harvest?

Is the Allowable Sale Quantity (ASQ) consistent with resource information and programmed harvest?

Are the Non-Interchangeable Components (NIC) of the allowable sale quantity consistent with actual harvest?

Is the proportional mix of volume in NIC I and NIC II as estimated in the Forest Plan accurate?

Should maximum size limits for harvested areas be continued?

Transportation

Are the standards and guidelines used for forest development roads and log transfer facilities (LTFs) effective in limiting the environmental effects to anticipated levels?

Wetlands

Are Wetlands Standards and Guidelines being implemented?

Are Wetlands Standards and Guidelines effective in minimizing the impacts to wetlands and their associated functions and values?

Wild and Scenic Rivers

Are Wild, Scenic, and Recreational River Standards and Guidelines being implemented?

Are Wild, Scenic, and Recreational River Standards effective in maintaining or enhancing the free flowing conditions and outstandingly remarkable values at the classification level for which the river was found suitable for designation as part of the National Wild and Scenic River System?

Wilderness Areas

Are standards and guidelines for the management of wilderness being implemented?

Are standards and guidelines for the management of wilderness effective in maintaining the wilderness resource?

Wildlife

Are population trends for Management Indicator Species (MIS) and their relationship to habitat changes consistent with expectations?

Are the population levels and associated distribution of mammalian endemic species on islands and portions of the mainland consistent with the estimates in the Forest Plan?

Costs and Outputs

What outputs were produced in the previous year?

Are the costs associated with carrying out the planned management prescriptions (including those of producing outputs) consistent with those costs estimated in the Forest Plan?

Appendix B

Best Management Practice Implementation Monitoring Report

Best Management Practice Implementation Monitoring Report

Background: Implementation of Soil and Water Standards and Guidelines is necessary to maintain soil productivity and water quality. The Soil and Water Standards and Guidelines are implemented as Best Management Practices (BMPs) described in FSH 2509.22. Region-10 Soil Quality Standards are documented in FSM 2554. Methods for effectiveness monitoring of Soil Quality Standards are referenced in the FSM 2554. Soil conservation practices are practices used to ensure that ground-disturbing activities will meet the R-10 Soil Quality Standards. Typical soil conservation practices include log suspension requirements in timber harvest units and the use of full-bench and end-haul road construction techniques on landslide-prone terrain. Implementation monitoring evaluates whether or not soil conservation practice(s) were required and implemented. Effectiveness monitoring determines whether or not the soil conservation practice used kept the ground-disturbing activity within the R-10 Soil Quality Standard.

The State of Alaska Water Quality Standards set standards for chemical, physical and biologic parameters of waters on National Forest System Lands. The Forest Service in Region-10 uses Best Management Practices and site-specific prescriptions to meet State of Alaska Water Quality Standards when implementing ground-disturbing activities on National Forest System lands.

BMPs were monitored on the Tongass National Forest using guidelines described in the Tongass Monitoring Strategy. The strategy was developed to provide direction for Forest Plan implementation monitoring. An interagency team of representatives from the Forest Service and Alaska Department of Environmental Conservation selected specific BMPs to be monitored, based on potential risk factors to soil and water resources.

Best Management Practice Implementation

The Best Management Practices (BMPs), described in the Soil and Water Conservation Handbook (Forest Service Handbook 2509.22, October 1996), define practices that protect soil and water resources. The Soil and Water Standards and Guidelines define site-specific measures to protect the resources. These standards and guidelines were monitored following a methodology described in the Tongass Monitoring Strategy. The Strategy was developed to provide direction for Forest Plan implementation monitoring.

The BMP implementation monitoring included two distinct efforts: (1) 100 percent monitoring of the units closed out and roads completed, and (2) Interdisciplinary Team (IDT) monitoring. The 100 percent monitoring was conducted primarily by Forest Service sale administrators and engineering representatives, with assistance from resource specialists in a few circumstances. A team of representatives from the Forest Service and other federal agencies as well as State agencies conducted the IDT monitoring. This team included sale administrators, engineers, foresters, planners, and resource specialists from soils, water and fisheries.

The quality control IDT monitoring was conducted on a stratified random sample made up of more than 10 percent of units and roads monitored during the 100 percent monitoring effort. Additional units from the 2000 unit pool were monitored by the IDT to address specific issues of concern by the Forest such as unit harvest in karst terrain and unit harvest in areas of steep slope gradient. Decommissioned roads monitored by the IDT were not monitored through the 100 percent process since they were outside the pool criteria. The respective ratings of the IDT and sale administrator/contracting officer's representative were therefore not compared on the decommissioned roads. Of the 91 units monitored in 2001, 83 were in the 2001 pool, 15 of which were monitored by the IDT. The roads implementation monitoring protocols cover only constructed and reconstructed roads. Of the 16 roads monitored in 2001, 9 roads were in the 2001 pool, 5 of which were monitored by the IDT. The 10% quality control threshold was met through the IDT monitoring in 2001. Two monitoring forms from bridge reconstruction projects were not submitted prior to this summary; their results will be considered in the 2002 pool.

The monitoring showed that the Tongass National Forest is implementing the standards and guidelines for protection of Soil and Water Resources. There was one departure from full implementation that was noted, a case where application of the BMP was questioned and some corrective action was implemented. In a few cases, following the monitoring, action plans were developed to complete additional work to fully implement the BMP.

Monitoring Context

Planning for some of the roads and units was completed before the Soil and Water Conservation Handbook was revised in October 1996, and new Forest Plan Standards and Guidelines were approved in May 1997. Both documents included many improvements for protecting soil and water resources. Several important changes in the 1996 Soil and Water Conservation Handbook include improving wetlands management direction, considering stream buffer wind throw, and generally making Forest Service BMPs consistent with State Forest Practices Regulations. A few of the important changes included in the Forest Plan Standards and Guidelines resulted in new stream class definitions, and stream protection measures required for each stream class and channel type. Buffer protection of Class III streams was entirely new. A number of the units monitored were planned, laid out, and harvested under pre-1997 Forest Plan Standards and Guidelines.

BMPs Monitored in FY 2001

BMP 12.5 Wetlands Protection Measures
BMP 12.6/ 12.6a Riparian Area Designation & Protection/ Buffer Zone Design and Layout
BMP 12.7/ 14.5/14.8 Measures to Minimize Surface Erosion
BMP 12.8/ 12.9 Oil Pollution Control Measures
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.5 Identification and Avoidance of Unstable Areas
BMP 13.9 Yarding Systems to Protect Soil/ Water Resources
BMP 13.10 Landing Location and Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads
BMP 13.16 Stream Channel Protection
BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription
BMP 14.7/14.12 Measures to Minimize Mass Failures/ Control of Excavation & Sidecast
BMP 14.9 Drainage Control Structures to Minimize Erosion & Sedimentation
BMP 14.14/ 14.17 Design & Installation of Bridges and Culverts
BMP 14.18 Control Rock Pit Sediment
BMP 14.20/ 14.22 Road Maintenance Access Management
BMP 14.26/ 14.27 LTF Surface Erosion Control Plan, Storm Water Pollution Prevention Plan

Monitoring Results

The tables and statistics discussed below reflect results from the total units and roads monitored in the 100 percent and IDT monitoring efforts. This monitoring covered 2855.5 acres of harvest units and 16 roads. Details of the monitoring of Best Management Practices are included in the "Description of Best Management Practices Monitored" section at the end of this appendix.

The implementation monitoring results are summarized in Table B-1. This table displays the total number of times each specific BMP was rated, the number of times "full implementation" was monitored, number of "departures from full implementation/BMP not implemented" was monitored, and the number of times "corrective actions" were implemented. In some cases, corrective action was taken so that the BMP was fully implemented before the unit or road was approved by either the sale administrator or contracting officers representative. In a few cases, the monitoring resulted in action plans being drawn up to complete additional work so the BMP was fully implemented.

Table B-1. Summary of BMP Use, Number of Departures, and Corrective Actions from Implementation Monitoring

BMPs Applied	Number of Times the BMP was Appropriate for Use	Number of Departures from full BMP Implementation/ BMP not implemented	Number of Times Corrective Action Implemented
12.5	37	0	2 (5.4%)
12.6/ 12.6a	64	0	0
12.8/ 12.9	99	0	0
12.17	58	1 (1.7%)	1 (1.7%)
13.5	44	0	5 (11.4%)
13.9	87	0	0
13.10	87	0	2 (2.3%)
13.11/ 13.14/ 14.5	74	0	1 (1.4%)
13.16	69	0	5 (7.2%)
12.7/ 14.5/ 14.8	15	0	1 (7.1%)
14.6	10	1 (10%)	0
14.7/ 14.12	4	0	0
14.9	11	0	1 (9.1%)
14.14/ 14.17	14	0	1 (7.1%)
14.18	7	0	0
14.20/ 14.22	13	0	0
14.26/ 14.27	82	0	0
	775	**2 (0.3%)**	**19 (2.4%)**

A significant length of stream channels was reported as protected during unit harvest in the implementation monitoring effort in FY 2001 as shown in Table B-2. These stream lengths and associated buffer areas show that stream protection measures are being implemented.

Table B-2. Linear Feet and Acres of Stream Channel Protected and Lakes Protected in FY 2001 (determined through implementation monitoring effort)

Stream Class	Linear feet of Stream Channel Protected	Approximate Acres Retained as a Streamside Buffer
Class I	9,476 feet	42.36 acres
Class II	11,514feet	37.85 acres
Class III buffered	77,662 feet	1034.44 acres
Class III un-buffered*	44,600 feet	
Class IV	62,210 feet	
Beach buffer		756 acres

* Unbuffered Class III streams in units planned, laid out, and harvested under pre-1997 Forest Plan Standards and Guidelines

Of particular interest to the Tongass are Best Management Practices associated with implementation of standards and guidelines related to riparian areas and streams. To address this interest, we included Table B-3 that shows subsets of the larger tables showing implementation monitoring data results. The number of the corrective actions reported associated with Best Management Practices evidences the efforts of the sale administrators and contracting officer's representatives to implement the standards and guidelines.

Table B-3. BMPs Relative to Riparian Areas, Streams, and Buffers Implemented in FY2001 by 100% Monitoring Effort

BMPs Applied	Number of Times the BMP was Appropriate for Use	Number of Departures from full BMP Implementation	Number of Times Corrective Implemented
12.6/ 12.6a	64	0	0
13.16	69	0	5 (7.2%)
14.6	10	1 (10%)	0
14.14/ 14.17	4	0	1 (7.1%)
Totals	147	1 (0.6%)	6 (4.1%)

10 percent IDT Monitoring

The IDT monitoring this year included two different size groups, large groups and small groups. The large group trips focused on review of application of new standards and guidelines and issues relative to wildlife, karst, alternative harvest methods, streams and road decommissioning/storage. The small groups completed most of the 10 percent quality control monitoring on the units.

The 10 percent monitoring was completed on four districts in eight geographic areas and ten harvest and road construction areas on the Craig, Thorne Bay, Wrangell, and Petersburg Ranger Districts. The selection process for the 10 percent quality control was limited to an application of the stratified random sample of the units available at the time of the monitoring trip in August. Due to harvest limitations dictated by court decisions on the Tongass, few units were in the selection pool. Many of the units harvested in FY 2001 were completed after August. The Interagency Monitoring & Evaluation Group (IMEG) selected the monitoring locations of units for the standard and guide review based upon significant aspects of the unit harvest and road construction.

A subset of the total BMP implementation monitoring pool consisting of 23 units and 13 roads was monitored during the 10 percent IDT monitoring process. This subset of the total BMP implementation monitoring pool consisted of 15 units and 5 roads from the FY 2001 pool. The IDT monitoring data from the 2001 pool was used to compare ratings and stream/ buffer delineation. The total IDT subset data was used for evaluation of departures from BMP implementation as well as identification of strengths and emphasis items associated with BMP implementation. Details of the IDT findings by BMP are listed in the "Description of Best Management Practices Monitored" section at the end of this appendix.

The 10 percent monitoring was completed on four districts in eight geographic areas and ten harvest and road construction areas as listed below:

Craig RD: Polk Inlet (West Polk TS Units 613-249, 613-107, 613-248, 613-233), Twelve Mile Arm (East 12 Mile TS Units 619-213, 619-215, 12 Mile LTF): monitored 6 units, 1 LTF.
Thorne Bay RD: Naukati-Sarkar (Chusini TS Unit 1), Heceta Island (Heceta Sawfly TS Units 2, 14, 20), Winter Harbor (decommissioned Roads 2050, 2050800, 2050810, 2050815), North Prince of Wales (decommissioned Roads 21120.186/ 120.208, 20 115.417): monitored 4 units and 6 decommissioned roads.
Wrangell RD: Deer Island (Kuakan TS Units 35A, 35B, 35C1, 35C2, 35C3), Etolin Island (King George TS Unit 9), Wrangell (Dash Road 5008 Storage, Pats Creek- State road): monitored 6 units, 1 FS decommissioned road, 1 State road & 1 LTF.
Petersburg RD: Kake (Shamrock TS Units 429-46, 436-47, 438-1), Portage Bay (Bohemia TS Units 509, 511, 508; Goose TS Units 538), Petersburg (Man-Made Hole Parking Lot, maintenance of Roads 6245, 6235, East Fork TS Road 6227, Dry Straits Bridge Replacement): monitored 7 units, 4 roads, 1 LTF.

During IDT monitoring the group noted soil, visual, timber, stream and buffer characteristics relative to the management practices. The logging systems and focus characteristics monitored are listed below:

- Shovel logging: soil compaction, soil disturbance, slope gradient limitations, and retention
- Shovel and cable logging utilized in salvage sale units: soil disturbance, stream protection, and stream/ karst buffers
- Helicopter logging: partial retention, soil disturbance, visuals, stream buffers and stream disturbance
- Running skyline and high lead logging: streams, buffers, and soil disturbance

The IDT group looked at road reconstruction, construction, and decommissioning in the road reviews. The focus characteristics monitored are listed below:

- Reconstruction of the culverts and bridges: fish passage and erosion control
- Construction of parking lot, timber roads, and road decommissioning: sediment control, and culvert installation
- Road decommissioning: culvert/bridge removal, erosion on fill slopes and cut slopes

IDT Monitoring Results

Table B-4 shows the number of times the BMP was applied during the IDT review and respective number of departures from full BMP implementation/ times BMP was not applied, as well as the number of times corrective action was implemented. Comparison of Table B-4 and Table B-1 shows that a number of corrective actions relative to BMP 13.5 and 13.16 were reported during the monitoring process that were not reviewed by the IDT. Table B-4 also shows the IDT monitored a number of the sites corrective actions were taken in implementing BMP 12.5, 12.17, 13.5, 13.11/13.14/14.5, 12.7/14.5/14.8, 14.9, and 14.14/14.17.

Table B-4. Summary of BMP Use, Number of Departures, and Corrective Actions from IDT Implementation Monitoring (10 percent)

BMPs Applied	Number of Times the BMP was Appropriate for Use	Number of Departures from BMP Implementation/ BMP not implemented	Number of Times Corrective Action Implemented
12.5	14	0	1 (7.1%)
12.6/ 12.6a	18	0	0
12.8/ 12.9	32	0	0
12.17	13	1 (1.7%)	1 (7.7%)
13.5	11	0	2 (18%)
13.9	22	0	0
13.10	21	0	0
13.11/ 13.14/ 14.5	16	0	1 (6.2%)
13.16	17	0	0
12.7/ 14.5/ 14.8	11	0	1 (9.1%)
14.6	5	1 (10%)	0
14.7/ 14.12	1	0	0
14.9	8	0	1 (12.5%)
14.14/ 14.17	9	0	1 (7.1%)
14.18	5	0	0
14.20/ 14.22	10	0	0
14.26/ 14.27	21	0	0
	234	**2 (0.8%)**	**8 (3.4%)**

Comparison of the stream data collected during the IDT monitoring effort shown in Table B-5 and the total implementation effort illustrated on Table B-2 shows that a significant number of the protected streams were checked during the IDT monitoring process. In the 10 percent quality control monitoring, well over 10% of the streams protected were reviewed by the IDT.

Table B-5. Linear Feet and Acres of Stream Channel Protected and Lakes in FY 2001 monitored by IDT in the 10 percent quality control sample

Stream Class	Linear feet of Stream Channel Protected	Approximate Acres Retained as a Streamside Buffer
Class I	4,176 feet	9.6 acres
Class II	5,284 feet	14.65 acres
Class III buffered	19,952 feet	20.67 acres
Class III un-buffered	16,900 feet	
Class IV	23,700 feet	
Beach buffer		85 acres

Table B-6 is a subset of the complete table that shows the BMPs monitored by the IDT that relate to riparian areas, streams and buffers. Comparison of this table and Table B-3 shows that the IDT monitoring was conducted on a high percentage of the sites where BMPs relative to riparian areas were applied. This comparison also shows that well over 10 percent quality control monitoring was achieved on these BMPs.

Table B-6. BMPs Relative to Riparian Areas, Streams, and Buffers Implemented in FY2001 by IDT Monitoring Effort

BMPs Applied	Number of Times the BMP was Appropriate for Use	Number of Departures from full BMP Implementation	Number of Times Corrective Implemented
12.6/ 12.6a	18	0	0
13.16	17	0	0
14.6	5	0	0
14.14/ 14.17	4	0	1 (7.1%)
Totals	44	0	1 (2.3%)

Summary of Monitoring Results

Generally 10 percent quality control monitoring completed by the IDT showed agreement with the monitoring completed by the sale administrators and engineering representatives. Monitoring showed that the Best Management Practices (BMPs) were implemented. The new numerical rating system that was added to clarify the BMP fully Implemented/Departure from BMP Implementation/BMP not Implemented System worked well. This numerical rating served to clarify the split between the ratings and help the group rate the BMP implementation more consistently. The numerical system rating facilitated reflecting upon the significance of the departure and the impact on the soil, water, and timber resources. There was minimal confusion identified on completion of the forms and interpretation of the rating system; the new format proved to be a significant improvement.

During the IDT monitoring, the group noted identified strengths associated with BMP implementation and a few BMPs that need continued emphasis. Strengths noted were associated with the following BMPs:

BMP 12.5 Wetlands Protection Measures
BMP 12.6/ 12.6a Riparian Area Designation & Protection/ Buffer Zone Design and Layout
BMP 12.7/ 14.5/14.8 Measures to Minimize Surface Erosion
BMP 12.8/ 12.9 Oil Pollution Control Measures
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.5 Identification and Avoidance of Unstable Areas
BMP 13.9 Yarding Systems to Protect Soil/ Water Resources
BMP 13.10 Landing Location and Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads
BMP 13.16 Stream Channel Protection
BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription
BMP 14.14/ 14.17 Design & Installation of Bridges and Culverts
BMP 14.26/ 14.27 LTF Surface Erosion Control Plan, Storm Water Pollution Prevention Plan

Emphasis items noted were associated with the following BMPs:

BMP 12.17 Revegetation of Disturbed Areas
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads
BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription
BMP 14.14/ 14.17 Design & Installation of Bridges and Culverts

The stratified random sample with the added sites of interest provided the IDT opportunity to review many of the sites where challenges with BMP implementation were identified and corrective action taken. This high percentage of review on these sites can be attributed to the fact that most of the sites that had significant stream concentrations, steep slopes, or alternative harvest procedures were selected through the stratified random process.

High quality work on the part of the sale administrators and layout crews was noted in identifying streams and adding implementation of stream course protection measures for streams that were missed in the planning and layout phases of unit preparation. Extraordinary work was completed on the part of the sale administrators in working with the sale area maps, contract provisions, operators, and resource specialists to harvest timber and protect timber, water, soil, and karst resources. The sale administrators worked diligently with the shovel operators to limit soil disturbance and keep retention trees in salvage logging units. In the shovel units, little soil disturbance was apparent. The sale administrators worked closely with the operators in the selective cut/partial retention units. In both salvage units and helicopter units, the sale administrators worked to retain structure, maintain wind firm buffers, protect streams, and limit soil disturbance. Some of the units monitored in the helicopter units had diameter prescriptions, some had individual trees marked, and some had areas designated for harvest/retention. These sale administrators did an incredible job administering harvest of these units to increase the buffer sizes on streams and wetlands, remove timber without damage to other trees or the soil resources, and effectively

harvest the timber from these units. The harvest monitored in karst terrain illustrated how salvage harvest could be effectively accomplished minimizing the impact to soil, water, and karst resources. This sale administrator worked closely with the operator to remove the timber in this salvage sale maintaining buffers and utilizing selective cut methods to protect timber, karst terrain, soil or stream resources. The sale administrators working on the salvage units worked with the operators utilizing logging systems to achieve suspension to prevent damage to the soil and stream resources.

Emphasis will continue on identifying streams missed during sale preparation, seeding temporary roads, ensuring water bars are functional, and seeding. Particular concerns were mentioned in the units that were developed, laid out and harvested under the old standards and guidelines in steep terrain. These concerns focused on the suspension requirements prescribed in the unit and the landslides and rock bluffs. Using today's policies, much of the over steep terrain with shallow soils and landslides would have been deleted from the unit. In situations where landslides are present, full suspension should be prescribed and planting vegetation/seeding considered.

During completion of the roads and post haul maintenance, continued emphasis is being placed on BMPs to ensure water bars are installed to minimize erosion and sedimentation and seeding. During road reconstruction and construction involving installation of culverts, special emphasis will be placed on constructing fill slopes that are less steep than the natural angle of repose of the soil and rock fill to prevent raveling and erosion. Emphasis will also be focused on shaping bridge abutments and fills to avoid raveling and erosion. Noted in the review was the need to increase focus on turbidity measurements. Particular steps need to be taken to ensure turbidity data is collected at culvert sites where the structures are greater than 48 inches in diameter or bridges are installed.

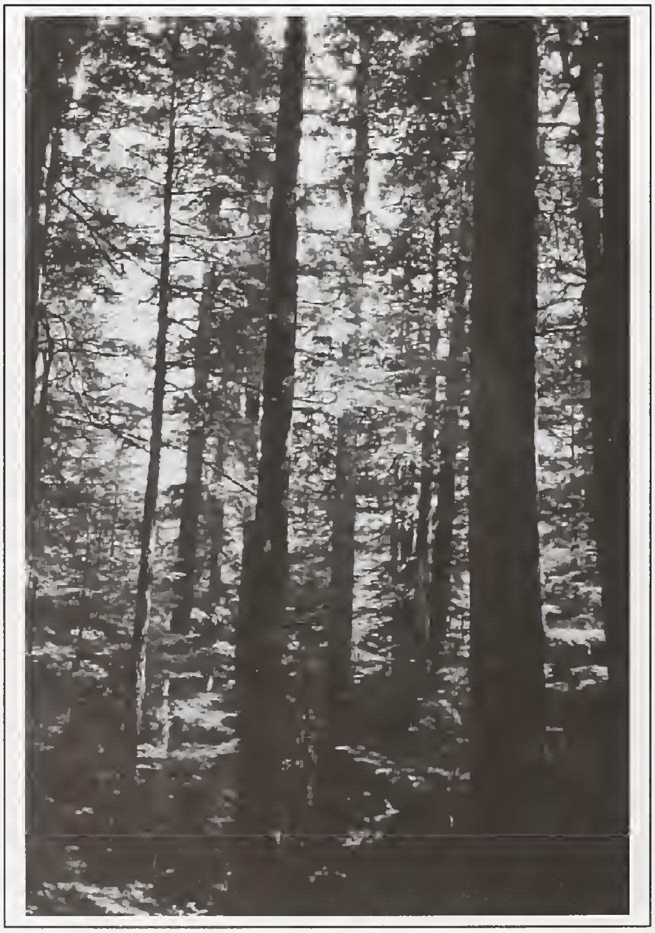
Generally, 10 percent quality control monitoring completed by the IDT was in agreement with the monitoring completed by the sale administrator and engineering representative, and showed that the BMPs were being implemented. The variation lied in differences of degree of BMP implementation that was detected in the BMP numerical rating attribute. Evaluation of the BMP rating attribute showed that in all except in 2 situations, the ratings ranged from 4-5 (where 5 is equivalent to the highest degree of BMP implementation). In these two situations, one rating of 2 was assigned and one rating of 0/1 was assigned. Comparison of these ratings shows the sale administrators and contracting officer's representatives were generally more stringent in their ratings than the IDT and more precise in measuring stream lengths/buffers.

Evaluation of Results

The results show that the Tongass has successfully implemented the Best Management Practices and is continuing to improve on implementing the BMPs as well as documenting the BMP monitoring. Specific details on the situations that were associated with the departure and lack of implementation as well as corrective actions taken in response to efforts to implement the BMPs are detailed in the "Description of Best Management Practices Monitored" section at the end of this appendix.

During IDT monitoring, the group noted identified strengths associated with BMP implementation and a few BMPs that need continued emphasis. Identified strengths of BMP implementation included:

- riparian area designation and implementation of buffers;
- stream channel protection;
- measures to minimize soil erosion;
- revegetation of disturbed areas;
- identification and avoidance of unstable areas;
- yarding systems to protect soil and water resources;
- landing locations and design;
- timing restrictions for construction activities/ fisheries prescription;
- design and installation of culverts;
- erosion control measures and plans;
- oil pollution control measures; and
- LTF surface erosion control/ Storm Water Pollution Prevention.



In the harvest units, continued emphasis is focused on minimizing soil disturbance during yarding operations and associated mitigation covering bared soil with vegetative debris and seeding. Emphasis is also being placed on BMPs to ensure road/ditch maintenance, seeding of temporary roads, and cross drain function when temporary roads are closed.

During completion of the roads, continued emphasis is being placed on seeding soil exposed in road cuts and providing required fish passage at culvert sites. Focus on the design of the culverts/bridges specific to the site will be emphasized on sites where structures are being replaced or removed. At these sites, detailed survey and investigation could provide data for designing slope gradients to minimize erosion and ravel into the stream courses.

Overall, the monitoring showed that the Tongass National Forest is implementing the Best Management Practices successfully. There was general agreement between the 100 percent monitoring effort and the 10 percent IDT monitoring effort. The sale administrators and engineering representatives demonstrated diligence in implementing appropriate protection of the stream courses, as well as prescribed suspension, effective culvert/water bar installation, and minimization of sedimentation in most cases. The terrain in some of these units was excessively steep, requiring extensive efforts on the part of the sale administrators to implement the BMPs. The sale administrators worked carefully to identify streams missed during the environmental assessments and during layout to implement the appropriate stream protection measures. The sale administrators worked closely with the contractors the shovel units to employ this logging system to effectively remove the logs with minimal disturbance to the soils and forested wetlands. Past and present monitoring shows that the success of the harvest and degree of soil and water resource protection is directly related to the efforts of the sale administrator and operator. In the shovel units monitored this year, the sale administrators and operators were highly successful in completing harvest and protecting the resources. In partial retention units, the sale administrators' role in resource protection is essential. Depending upon the harvest prescription, the work of the sale administrator varies from working with the operator to designate specific trees to areas. Timber harvest, particularly yarding in partial retention units that contain streams, requires specific over site of the sale administrator. Monitoring shows that the sale administrators did an extraordinary job.

In some situations, additional efforts need to be extended to implement the BMPs. There was one departure from full BMP implementation noted and one case where there was question as to whether the BMP was implemented as summarized below:

- The departure occurred on a road where a culvert was installed, with permission from FS and ADF&G biologists, outside the fish-timing window. This particular culvert was replaced in an effort to improved fish passage at the site. The contracting officer's representative made the request for installation outside the timing window during construction.

- The situation where question was raised over whether the BMPs were implemented involved a unit where landslides and rock cliffs were shown in the unit. This particular unit was planned, laid out and harvested under the old standards and guidelines. A soil scientist's report on the unit shows prescription for full suspension over the upper portions of the slide and partial suspension over the lower portions of the slide. Full suspension over the top part of the slide was achieved through helicopter logging. Full suspension to partial suspension was achieved over the lower portions of the slide. During IDT review, the soil specialist and hydrologist felt the BMP was not applied. These two members questioned whether planting should have been addressed in the soils prescription. Other members of the group felt that because the landslides were addressed in the soils report and a site specific prescription was developed for this unit and the District Ranger signed off on this prescription, the BMP was applied. If this unit were planned, laid out, and harvested under the new standards and guides using today's policies, the over-steep terrain/rock cliffs with the shallow soils and the landslide areas probably would have been deleted from the unit.

Recommendations

In conclusion, the sale administrators and engineering representatives have a strong understanding of the Best Management Practices (BMPs), and work to implement these BMPs on the ground. The sale administrators, engineering representatives, and contracting officer's representatives have responsibilities for implementation of many of the BMPs through administering the timber sale and public works contracts. They closely inspect these contracts and work with the operators to ensure compliance with many of the BMPs. Through the hard work and diligent efforts of the sale administrators, engineering representatives and contracting officers representatives, the BMPs are implemented on the ground.

The IDT monitoring of the Tongass this year shows that the sale administrators, engineering representatives, and contracting officers representatives are consistently implementing these BMPs fully and monitoring them following the same criteria as the IDT. This is a trend that has continued to improve over the past four years until we are now nearly at 100 percent full implementation of the BMPs. We need to consider moving toward monitoring a smaller subset of the roads and units.

The IDT recommends focusing on emphasis items rather than the specific rating for the BMP. The group feels that this trip should be a communication opportunity to discuss interpretation of implementation of the BMPs. The group does not feel that it is significant to focus on the specific ratings. The orientation of the group is toward interpretation and implementation rather than a rigorous inspection of detail. The group feels that a more distinct feed-back system needs to be developed to get information from monitoring back to the planning, design, layout, and contract preparation groups.

Recommendations to simplify the monitoring form and break the IDT review into two groups were completed this year. These two groups consisted of a large group that focused on issues primarily but also completed some of the IDT 10 percent quality control monitoring and a small group that completed the bulk of the IDT 10 percent quality control monitoring. This two-group approach seemed to work effectively and should be continued if time and budgets can accommodate this level of monitoring. This year we also added additional Forest biologists, hydrologists, and timber logging specialists. These additional specialists contributed insight on the resources as well as logging systems designs and capabilities. If funding and personnel are available, recommendations follow to include these specialists. The criteria for selecting the units and roads for IDT review should continue to emphasize the areas showing steeper slopes and Class I, II, III, and IV streams. The larger IDT group comprised of FS staff, FS specialists, monitoring coordinator, and representatives should review areas that illustrate implementation of new or controversial standards and guides, timber harvest and road construction sites during actual implementation of the BMPs and standards and guidelines.

Recommendations specific to the monitoring form were completed prior to the FY 2001 field season. An additional attribute was added to the rating system to help delineate the differences between the ratings. This attribute further described the rating system for the BMP implementation indicating the percentage of full BMP implementation (e.g., ratings included a 0-5 reflecting the degree of implementation) in addition to the fully implemented (Y), departure (D), not implemented (N) system. The form was also simplified to require fewer entries. Further direction was provided on what constitutes a departure. These changes contributed to more consistency in monitoring and form completion.

Description of Best Management Practices Monitored

Corrective actions were implemented and departures occurred in several BMPs. Corrective actions were implemented 19 times in efforts to fully implement the BMPs or mitigate the effects of the incidents on the soil and water resources. In several of these situations, these corrective actions were effective in facilitating full BMP implementation. Departure from BMP implementation was reported one time and BMP application was questioned in one situation. Brief summaries of some of the details associated with BMP implementation monitoring on the Tongass in FY 2001 are listed below:

BMP 12.17 Revegetation of Disturbed Areas

Generally this BMP was applied on unexpected disturbances that occurred in isolated portions of the units. The revegetation was achieved through seeding. Corrective actions were applied two times and one case of possible lack of implementation was reported. During sale administration in one Hoonah unit, stumps were removed to accommodate shovel logging and as a corrective action the stumps were replaced. The IDT review included one unit where corrective action was applied in a Heceta unit where grass seed was applied during sale administration on some soil disturbed in the yarding corridor. This soil disturbance was less than 10 % on the surface. The seed was starting to germinate in the yarding corridor. In one Craig 2000 unit that was monitored by the IDT to review applications of old standards and guidelines specific to steep terrain, a question as to whether this BMP was applied. In this particular unit, small slides and rock bluffs were observed in the upper portions of the unit. Some of these slides were pre-harvest although distinct age dating of the slides and extent of the slides relative to harvest were unknown. In the soils report, there was no mention of vegetating these areas. Partial to full suspension was prescribed in this unit, full suspension (helicopter) over the top portions and partial suspension in the lower portion of the unit. Partial to full suspension was achieved in this unit. No buffers were recommended adjacent to the slide in the soils report due to concerns about windthrow. The soils specialists participating in the IDT review were not sure if planting would serve to vegetate the slides since the slopes were primarily rock and soil shown on an unstable over-steep terrain.

Strengths noted during IDT review included: Seeding effectively was implemented in a situation where partial suspension of logged trees caused soil disturbance in less than 10 % of the Heceta unit. Areas were effectively seeded in another Heceta unit.

Emphasis items noted during the IDT review included: Revegetation evaluation is necessary on all units showing landslides whether pre- or post- harvest. Specific consideration of the landslides and dropping of those portions of the unit would have been recommended under the new standards and guidelines. Under the old standards and guidelines, landslide areas and oversteep terrain were left in the unit. The logging system was designed to minimize impact on the landslide areas (e.g. helicopter top portion of unit to achieve full suspension).

BMP 12.5 Wetlands Protection Measures

Generally, this BMP was fully implemented on the units eliminating wetland areas during layout. In several of the units, isolated wetland areas were deleted or boundaries changed to avoid wetlands. One corrective action was reported on a Heceta unit with respect to enlarging the buffer on wetlands adjacent to karst to minimize impact. In two additional Heceta units, the unit boundary was pulled back to avoid wetlands. A corrective action was reported on one Hoonah unit where puncheon was utilized in a wetlands area then removed after yarding was completed; full suspension was achieved. Borrow sources for rock used for a bridge replacement contract were located upland of a wetland area to minimize impact to the wetland. On a parking area construction contract, a Corp of Engineers Permit was obtained for 0.92 acres of wetland in the road corridor. On five Kuakan Timber sale units and one King George Unit reviewed by the IDT, small inclusions of forested wetland were noted in the units and no disturbance was noted due to full suspension achieved through helicopter logging. In one 2000 West Polk Unit, partial suspension was prescribed in the forested wetland areas due to landform restrictions with the logging system. In a second West Polk unit, forested wetland inclusions were dropped from the unit. In a third

West Polk unit, the boundary was changed to exclude wetlands, although in this unit logs were stacked in a forested wetland area.

Strengths noted during the IDT review included: Adjusting the unit boundaries to avoid wetlands; deleting portions of the units in the Heceta Sawfly and West Polk timber sales to avoid wetlands were effective methods to minimize impact to wetlands. Prescribing and achieving full suspension in forested wetlands in the Kuakan and King George Timber Sale units were noted.

Emphasis items noted during the IDT review included: Logging systems should be prescribed to achieve full suspension in wetlands when possible. Logs should not be stacked in wetland areas.

BMP 13.10 Landing Location & Design

Generally, this BMP was implemented successfully by careful selection of landing locations in areas where impact to streams and wetlands were avoided and impact to soils was minimized. Several of the units were helicopter logged and the landings were on to barges or utilized old landings from previously logged units. Utilization of old landings was also implemented in some of the shovel and cable logging systems and served to minimize impact from landing location. Corrective action was completed in one Hoonah unit where timber debris was removed from a stream by hand cleaning. Corrective action was reported on a Ketchikan unit where there was some soil disturbed from a blind lead on two yarding corridors. In response to the disturbance, the location of the yarder was changed and increased caution was exercised in yarding to protect the soil.

Strengths notes during the IDT review included: Successful location of landings to minimize impact to soils, streams, and wetlands associated with landings and associated yarding. Numerous landings were made to barges and existing landings. The helicopter logging provided full suspension to the landings.

Emphasis items noted during the IDT review: No emphasis items were noted during the IDT review.

BMP 13.16 Stream Channel Protection

Generally stream channel protection was implemented through buffers, directional felling and logging tree debris removal. To protect the stream channels, buffers were implemented on Class I and II streams in units. In the units harvested under the Forest Plan standards and guidelines, buffers were intact on Class III streams and in many cases the buffers were expanded to include the entire v-notches. In the units harvested under the previous standards and guidelines, full suspension was implemented in most yarding across Class III channels in the units. Partial suspension was implemented other situations. Directional felling was implemented in the Class III streams and Class IV streams. Tree debris from logging was cleaned from the Class III and IV stream channels as required.

Corrective actions included: Removing tree debris from logging operations from the streams in one Hoonah stream, suspending logging operations in one Ketchikan unit where 2 logs were felled from the stream buffer, in three Petersburg units identifying and protecting streams (green/white- Class III - IV) not identified in the pre-sale and contract phases of unit harvest through adding suspension requirements and directional felling.

Strengths noted during the IDT review included: Buffers on Class I, II, III streams were intact in all but one of the units monitored (in this unit wind throw occurred). Tree debris removed and directional felling on Class III and IV streams as prescribed. Full suspension achieved on all units harvested under the new standards and guidelines. Unit boundary changed to move outside stream v-notch. No disturbance noted in stream channels.

Emphasis items noted during the IDT review included: Stream classifications need to be standardized Tongass-wide. Emphasis is needed in stream identification at the time of environmental assessment and layout.

BMP 13.5 Identification & Avoidance of Unstable Areas

Standards and guidelines for slope stability were implemented to identify steep slopes and implement prescriptions to prevent additional slope stability problems. In units harvested under the new standards and guidelines, unit boundaries were moved to eliminate areas where soils that were rated as high hazard soils for slope stability and areas of slope gradient that exceeded 72%. Most of the units that showed some areas of slope gradient greater than 72% were in Wrangell. In the Wrangell units, helicopter logging was utilized to minimize potential for slope stability problems on to high hazard soils exhibited on steep gradient slopes. Corrective actions were completed in Petersburg and included: changing the unit boundaries to eliminate high hazard soil areas showing slopes of greater than 72%, revising the harvest prescription during layout where high hazard soils were identified but not shown on the ground. In one Craig unit, where unit lay out and harvest were completed under the old standards and guides, significant portions of the unit showed rock bluffs and landslides. Soils prescription in this unit identified the landslides and steep areas; however, the prescription provided full to partial suspension on the steep slopes relative to the stability of the terrain. Under current standards and guidelines, the portions of the unit showing the shallow McGilvery soil and the landslides would have been dropped from the unit.

Strengths noted during the IDT review included: Helicopter logging was effective in minimizing impact to areas of high hazard soils and slopes with gradients greater than 72% in the Wrangell units. No soil disturbance was noted in the units harvested with helicopter logging and other systems where full suspension was achieved. The partial selection harvest using helicopter logging systems on steep terrain showed no impact to the high hazard soils on the over steep slopes. The partial selection left relatively large portions of the canopy standing thus would not increase the potential for slope stability problems associated with wind throw. Depending upon the prescription associated with the partial cut, very few trees were removed and the distribution of the trees that were cut varied from isolated patches to well dispersed isolated trees.

Emphasis items identified during the IDT review included: Recommendations that in units that contain landslides where barren rock bluffs to over steep soil slopes are shown, revegetation of alder planting should be addressed, and full suspension should be required if that portion of the unit is not deleted. This West Polk unit was laid out and harvested under the old standards and guidelines, where specific highlighting of the 72% slope criteria was not as prevalent although standards and guidelines did provide direction on slope stability issues associated with slopes greater than 75% slope. The practices of removing significant portions of the units with steep slopes showing landslides and buffering slide areas are widely accepted as the most viable alternatives under the new standards and guidelines. Under the old standards and guidelines other methods were applied to try to minimize impact to the area yet minimize cost and maximize the volume of timber harvested. Some of these methods employed in this unit included not leaving buffers around these areas in an effort to minimize windthrow and prescriptions for full suspension only on portions of the slides that were unstable. The IDT was unsure if alder planting would have been recommended for this unit since it still showed signs of active sliding and portions of the landslide were eroded to barren rock. Some members of the IDT felt the BMP was not implemented in this unit; other members felt the BMP was implemented. The landslides in this unit were specifically addressed during layout and a prescription was written for full to partial suspension and implemented.

BMP 13.9 Yarding Systems to Protect Soil/Water Resource

Yarding systems to protect soil resources and streams were implemented in the units monitored. This BMP was fully implemented in all units with only one minor incidence where 2 cable corridors showed minor soil disturbance (occupying less than 10 % of the unit). In this Heceta unit, seeding was completed to minimize the potential for soil erosion. Numerous units were helicopter logged and showed full suspension. In these helicopter units, much of the structure was left standing and the potential impact to the soil and water resources was eliminated. No signs of soil disturbance were noted in the helicopter

units. Partial retention was implemented in many of the Wrangell and Petersburg units that were helicopter logged and also in the shovel logged units in karst terrain in Heceta. This partial retention was implemented to protect the soil and water resources. Partial suspension and minimum disturbance to the soil and water resources was achieved through shovel logging in the other Thorne Bay and Petersburg units. In some of the Ketchikan units and other Petersburg units, protection of soil and water resources were implemented through full suspension prescriptions that were fully implemented.

Strengths identified through the IDT review included: The prescriptions for full and partial suspension were met and implemented protection of soil and water resources. In the units harvested on Heceta, no disturbance was noted in the shovel yarded portions. Helicopter logged units on Wrangell showed no signs of disturbance to the soil and water resources. The full suspension and partial retention provided protection to the soil and water resources. Helicopter logging provided the opportunity to increase buffer widths. Buffers left on the stream courses and v-notches exceeded the minimum buffer requirements and provided additional stream course protection. Shovel yarding provided protection for the karst and associated water resources on Heceta in the salvage sale units. The prescriptions were implemented on the Shamrock, Goose, and Bohemia Timber Sales.

No emphasis items were noted during the IDT review.

BMP 14.18 Control Rock Pit Sediment

Rock pits were located outside stream channels and were not located in areas of high mass movement soils. Sediment and drainage control was implemented. On the decommissioned roads on Thorne Bay and Wrangell Districts, control of rock pit sediment and drainage was implemented and the drainage ditches were functional. On the Petersburg road, the rock pits were located distant from the streams and a sediment pond constructed as needed. On the Wrangell road, rock was thrown down the lower side of the road adjacent to the rock pit; however, the rock was picked up. Seeding, silt fence and catch basins were utilized to prevent sediment transport and erosion.

Strengths noted during the IDT review included: The maintenance contract at Petersburg District was focused on preventing erosion and controlling sediment transport. The maintenance contracts contribute significantly toward controlling runoff and erosion. The East Fork road monitored showed a significant distance from the rock pit to any stream course. The sediment pond constructed on the Petersburg parking lot project was functional and prevented sediment transport.

No emphasis items were noted during the IDT review.

BMP 14.6 Timing Restrictions for Construction Activities/Fisheries Prescription

The timing restrictions for construction activities and fisheries prescriptions were implemented on all roads except one Petersburg road. On this road, construction was completed outside the timing window; however, the FS and ADF&G fish biologist granted permission for construction outside the timing window. At this site, there was a departure from full BMP implementation. The corrective action applied consisted of the engineer requesting and receiving permission for construction outside the timing window during actual site construction. This request was made to facilitate the construction schedule and no distinct impact to the fish resources was noted although this was a Class I drainage structure.

Strengths noted during the IDT review included: the road decommissioning projects showed fisheries prescriptions were implemented. No sites with timing restrictions were reviewed.

No emphasis items were noted in the IDT review.

BMP 14.9 Drainage Control Structures to Minimize Surface Erosion & Sedimentation

Culverts/water bars were functional and adequate numbers structures were constructed to fully implement this BMP. In one situation on Thorne Bay District on a decommissioned road project, the silt fence and straw bales were not removed immediately after construction. This resulted in a corrective action that was implemented to remove the silt fence and straw bales. The focus of the maintenance contract completed in Petersburg was to reconstruct culverts and drainage ditches to provide effective water transport, reduce erosion and sediment transport. On the timber sale road monitored in Petersburg, prehaul maintenance was preformed to clean catch basins and several culverts were installed to make culvert spacing functional.

Strengths identified during the IDT review included: The construction of functional water bars on decommissioned roads is being implemented. The maintenance contracts on roads to reconstruct drainage ditches to make the culverts functional were completed to fully implement this BMP. The installation of the culverts monitored on the Petersburg road shows adequate numbers and spacing of culverts; minimizing surface erosion and sediment transport.

Emphasis items noted during the IDT review included: Monitoring of the NPOW road decommissioning showed that continued emphasis need to be placed on removal of straw bales and silt fence following construction. Following the IDT review, the straw bales and silt fence were removed.

BMP 12.6 Riparian Area Designation & Protection/ BMP 12.6a Buffer Zone Design and Layout

Protection measures for riparian areas were prescribed in the units monitored. Stream identification and buffer zones were designated in these units. Riparian buffers, beach buffers, and estuary buffers were implemented. In the Heceta units, all buffers were intact and wider than the 100 feet prescription. One unit boundary was located to provide a stream buffer. On the Wrangell units, buffers 100 feet wide were designated in streams/riparian areas, 330 feet buffers were designated around eagle trees, and 1000 feet buffers were designated to the beach. The buffers implemented exceeded the minimum requirements and protected the riparian areas. In the Petersburg units, few of the units monitored showed any riparian areas.

Strengths noted during the IDT review included: Riparian areas were identified and protection measures implemented in the units monitored. Heceta units showed all buffers intact and exceeded the minimum buffer requirements. Buffers were identified and implemented fully in the Wrangell units. Helicopter logging and partial retention provided opportunity to leave buffers that exceeded the minimum buffer requirements and contributed additional riparian protection. The structure left in the units provided wind firm protection to the buffers. The buffer on Honeymoon Creek provided protection for the stream course and associated alluvial fan on this Class I stream.

Emphasis items noted during the IDT review included: Buffer configuration in some of the units in Craig that were laid out and harvested under the old standards and guidelines contributed to wind throw. Although these buffers were designated and implemented, they are not providing the protection intended.

BMP 12.7/ 14.5/ 14.8 Measures to Minimize Surface Erosion

Erosion control plans were implemented. Measures to minimize sediment transport were implemented including ditch dams, sediment basins, and silt fences. Seeding was implemented on roads along road cut slopes and bridge replacement sites to minimize surface erosion. An erosion control plan was closely followed at the Last Chance Campground where silt fence and straw bales were utilized to prevent surface erosion. Seeding was completed immediately during construction on the Petersburg road construction and maintenance projects. Seeding at Petersburg bridge replacement sites was completed following construction. Silt fence and sediment basins were installed at the Petersburg parking lot construction site. A sediment basin was installed on the Petersburg road construction project to minimize

sediment transport. Measures to minimize surface erosion were implemented on the Wrangell constructed and decommissioned roads. On Prince of Wales decommissioned roads, seeding was not complete on all projects.

Strengths identified during the IDT review included: The immediate seeding at construction sites on the Petersburg road construction and maintenance projects contributes to prevent surface erosion. The silt fence installed at the Petersburg parking lot project and sediment basins installed were measures implemented to minimize surface erosion. A buttress constructed on the Wrangell road decommissioning project controlled soil sloughing and erosion.

Emphasis items identified during the IDT review included: Seeding needs to be completed as soon as possible following construction and decommissioning and a follow-up process of re-seeding needs to follow to cover areas that are missed or the seed does not germinate. On several of the Prince of Wales decommissioned roads, the seeding showed several areas of barren soil. Soil exposed in bridge replacement sites as shown at the Dry Straits Bridge replacement sites needs to be seeded immediately following construction. Soil slopes need to be constructed at the natural angle of repose of the soil or slopes incised and benched to limit soil erosion. Along Road 6314 most of the cutbanks showed seeding was implemented; however, on a few cutbanks along Road 6314 on the Shamrock Timber Sale, the seed did not germinate or coverage was not complete. These cutbanks need to be re-seeded and monitored for grass seed germination/coverage.

BMP 12.8/ 12.9 Oil Pollution Control Measures

Pollution prevention plans were in place and implemented. Absorbents were on site and readily available for use. Fuel containers and filters were properly disposed and taken from site to approved disposal sites. Stained soil was removed from the site and disposed in approved disposal areas. Good housekeeping measures were implemented. On the Last Chance pipe construction project, the equipment was inspected daily for leaks and all equipment removed from the site when it was not operated. Pollution control measures were implemented and petroleum spill absorbents were readily available. On the Heceta units, no stained soils, cartridges, nor filters were observed on the roads and landings. On the Petersburg units, roads and bridge replacement sites, good housekeeping was maintained at all times. Spill prevention countermeasure controls (SPCC) were in place and implemented. The Wrangell units and roads had SPCC plans in place and implemented. No evidence of spills was observed. On the King George units, the fuel truck was removed from the site daily after operations shut down. The Wrangell helicopter staging areas followed a strict spill prevention protocol with self-contained tanks with exterior containment dikes and fuel buildings with containment systems. The Petersburg helicopter logging operation implemented a spill prevention program. During harvest of these helicopter units, no spills were reported and good housekeeping maintained.

Strengths noted during the IDT review included: No stained soil, lubricant cartridges, gas and diesel fuel containers were found at any of the units monitored. The SPCC plans were in place and implemented. The operators and SA/ER/CORs had a high awareness of oil pollution prevention and the necessary notification and clean-up requirements associated with fuel spills. At the Heceta LTF, the operator parked his equipment on fabric liners to prevent any leaks to the subgrade. On the Shamrock, Bohemia, and Goose Projects, good housekeeping procedures were followed. The helicopter operations at the Kuakan Timber Sales showed outstanding implementation of SPCC plans. The helicopter staging area was very organized with clearly marked tanks, orderly storage and readily available absorbents and absorbent boom, self-contained tanks with exterior containment, and containment systems on storage buildings for chainsaw fuel. The fuel truck from the King George was removed from the site daily to limit the potential for fuel leaks and spills; less fuel was on site at any one time.

No emphasis items were noted during the IDT review.

BMP 13.11/ 13.14/ 14.5 Erosion Control Measures- Units, Temporary Roads

Erosion control measures were implemented and erosion control mechanisms were in place on the timber sale roads. Temporary culverts were removed on the temporary roads in most cases. In many of the units, no temporary roads were necessary; many of the units harvested were helicopter and shovel units. A few temporary roads were deleted from units thus, contributing to lessening the impact on the soil resources. One of these deletions was noted as a corrective action implemented during sale administration. A temporary road was added to one Shamrock unit to aid deflection in yarding and protect a lake buffer. On the temporary roads on Heceta, one temporary road had drainage structures that were left in place to lessen the impact on the karst resources. As noted in the corrective action needed on this road, these structures need to be removed through initiation of a road contract. In the Hoonah unit, the culverts and ditches were monitored and noted cleaned post haul as part of an implemented corrective action. In the Slider and Relief Timber Sale units on Thorne Bay District, the spur roads were closed and blocked showing no signs of erosion. Some of the King George units on Wrangell District used existing temporary roads. The Twin Creek 15 Timber Sale used existing roads; no new roads were constructed.

Strengths noted during the IDT review included: The number of new temporary roads was noted to be significantly less, as a number of the units monitored were helicopter and shovel yarded units. During the IDT review, temporary roads on the Heceta, Bohemia, Goose, and Shamrock Timber Sales were monitored. In the temporary roads monitored, surface erosion was negligible.

Emphasis items noted during the IDT review included: The closing of system roads needs to be coordinated with closure of any temporary roads that need closure. On one Heceta temporary road, the road had been left open due to karst concerns; however, upon review should now be closed. In this road system, the system road that accesses this temporary road is already closed. The IDT noted one ditch on one of the Heceta roads that is pooling water possibly due to wind throw and changes in the karst surface water hydrology patterns. At this site, a cross drain will be installed and corrective action was anticipated to occur following the IDT review. All other sections of these temporary roads showed no erosion of the road surface and no down cutting in the ditches.

BMP 14.14/ 14.17 Bridge/Culvert Design, Installation & Removal

Culverts and bridges were installed using methods to minimize sedimentation such as minimizing the amount of in channel excavation, end hauling excavated materials, and shaping slopes to gradients more shallow than the natural angle of repose of the fill material in most cases. Turbidity measurements were taken at only one Petersburg site although 12 sites where turbidity measurements would have applied were installed. The goal of the Forest last year was turbidity measurements collected at 40% of these sites; this one site represents 8%. Forest Service and ADF&G concurrence was reached at all sites requiring fish passage and the concurrence details were implemented. On the South Arm Timber Sale road, a bridge was installed with no in stream work in placing the sills or in construction of the bridge deck. In the Dry Straits Bridge repair contract, the bridges were designed to provide fish passage and installed with ADF&G concurrence. A couple of the fill slopes on the excavated material were steeper than the natural angle of repose of the soil and were placed adjacent to the stream banks. The fill slopes on the culvert removal sites on the North Prince of Wales (NPOW) road decommissioning projects were over steep; recommendations follow to flatten these slopes to limit soil raveling. Monitoring of the culverts installed, these structures on the Petersburg roads and Last Chance Campground showed that they were installed according to the plans to provide fish passage per ADF&G concurrence. The pipes installed on the Last Chance Campground included replacement of undersized and perched culverts with a bottomless arch and buried 108-inch pipe. The 108-inch pipe was buried 4 feet to simulate natural stream course through the culvert.

Strengths noted during the IDT review included: The culverts removed on the North Prince of Wales road decommissioning project returned most of these crossings to their natural gradient. The culverts on the Petersburg roads were installed according to plans although prior notice was not given to the ER. One Petersburg culvert was installed to minimize sedimentation.

Emphasis items noted during the IDT review included: The stream gradients on a couple of the culvert removal sites on the NPOW project needed to be reconstructed to lower the elevation to the natural stream gradient and widen the channels. The cut slopes at some of these sites and fill slopes on the excavated material need to be flattened to the natural repose of the soil to decrease erosion potential. Improved communication is necessary to ensure that the opportunity to take turbidity measurements at the appropriate times during culvert and bridge installation occurs. At the one site monitored in Petersburg, turbidity measurements were not taken because the COR was not kept current with the installation schedule. Due to lack of time and personnel, the turbidity monitoring was not conducted on the Dry Straits Bridge Replacement Contract. Additional field personnel and attention to the particular details of turbidity monitoring is necessary; this monitoring should occur on at least 40% of the sites where culverts are greater than 48 inches in diameter and bridges where in stream work occurs. The IDT noted the abutments of the new bridges installed on the Dry Straits Bridge contract were constructed at gradients that were excessively steep and showed potential for erosion and sedimentation. The IDT recommends incising the old abutments to reduce the slope since the new abutments are on a terrace above the old abutments. Further investigation should focus on the history of stability associated with the old abutments, channel gradient and bottom type and should be continued with the design engineers.

BMP 14.20/ 14.22 Road Maintenance/Access Management

The access management associated with each of the roads monitored this year was defined and implemented. Road maintenance and post haul maintenance was completed to prevent sedimentation and erosion. The roads that were closed were seeded; hydro-seed sites showed high percent germination and growth. Two road maintenance contracts were monitored in Petersburg; the focus of these contracts was ditch reconstruction/cleaning and culvert re-installation and cleaning.

Strengths noted during the IDT review included: The access management objectives for the roads are being implemented. Most of the roads monitored were decommissioned roads or maintenance contracts. The focus of these contracts is to close the roads and provide appropriate cross drains to prevent surface erosion of the roads and maintain the natural stream courses at the sites were culverts and bridges are

removed. The hydroseeding completed on the Dash Road storage was well implemented; the seed showed a high percentage of germination and cover. The culvert removal site on this project, showed return of the natural channel banks with extensive quantities of fill removed. At this site, the excavated material was sloped at a gradient flatter than the natural repose of the soil and should not ravel. The cut banks were buttressed in several locations to limit erosion and sloughing. On this road, the fill material removed from excavated culvert sites was located away from the stream courses and shaped to prevent erosion. These fill piles were designed at angles to direct water flow off the road surface.

Emphasis items noted during the IDT review included: The cut and fill slopes on the culvert and bridge removal sites on the decommissioning projects need to be flattened to prevent erosion. These slopes should be designed specific to the soil and rock type and constructed at gradients less than the natural angle of repose of the soils. Particular concern over these slopes was raised on the NPOW road-decommissioning project. Also raised on this project, was a concern that one of the stream courses was not returned to the natural width. Concern on the quality of the rock on the running surface of the North Fork Road was raised; the group noted degraded rock material that formed a muddy surface on the road. This rock was a friable schistose rock that was unsuitable for surface material; the IDT recommends consideration of capping the road, restricting haul, utilizing rock from a different source, or helicopter-logging units where suitable rock sources are not available.

BMP 14.26/ 14.27 LTF Surface Erosion Control Plan/Storm Water Pollution Prevention Plan

Surface erosion control plans specific to the LTF were implemented at sites where LTFs were utilized. At these sites, storm water pollution prevention plans were implemented. Settling ponds were installed at the LTF sites. Good housekeeping was monitored as implemented, with used fuel containers or lubricant containers disposed of properly. The road surface was graded and the wood debris shown on the running surface was disposed of according to the storm water pollution prevention plans. Erosion control measures such as grading the surface away from the ocean and installation of drainage ditches and cross drains was implemented. At the sites where site compliance inspections were required, these inspections were completed and in some cases subsequent inspections after the projects are completed were scheduled. Remediation work was ongoing at the Port Alice LTF associated with the Heceta Sawfly Timber sale. This work included re-excavating a drainage ditch and settlement pond system. On the East Fork Road, King George Timber Sale, and Twin Creek Timber Sale, particular attention was given to the erosion control plan at the LTFs. Settlement ponds were built to prevent sedimentation and good

housekeeping observed. On the LTF utilized by the Twin Creek Sale, a corrective action of constructing a sediment trap was implemented but a rock lift needs to be constructed.

Strengths noted during the IDT review included: The remediation work ongoing at the Port Alice LTF used by the Heceta Sawfly Timber Sale will contribute to improve the surface drainage and direct the water through a sediment pond and ditch system. The precautions taken by the operator to prevent contamination of the site included parking equipment on fabric liners to ensure fuel and lubricants did not contaminate the subsurface. The sediment basins monitored on the Petersburg roads were well functioning and storm water pollution prevention plans implemented were applicable. The 12 Mile LTF used by the East 12 Mile Timber Sale showed a well graded running surface, clean of bark debris, a settling pond.

No emphasis items were noted in the IDT review.

BMP 14.7/ 14.12 Measures to Minimize Mass Failures/ Control Excavation and Side cast

Implementation of this BMP primarily involved end haul and measures to limit erosion and mass failure this year since very little road construction was completed. On the Dry Straits Bridge Replacement Contract, end haul was implemented. The excavated material was stockpiled in a rock pit located a distance from the streams. On the Last Chance Campground Pipe Replacement Project, brush and old road fill material was end hauled immediately from the site. Extreme caution was exercised to ensure material did not re-enter the creek at the bottomless arch and 108-inch pipe installation sites. No material was side cast at the arch pipe and culvert installation sites.

Strengths noted during the IDT review included the effective implementation of end haul on the Dry Straits Bridge Replacement Project.

No emphasis items were noted during the IDT review.

Appendix C

Hoonah Stream Crossing Monitoring, FY 2001

Hoonah Stream Crossing Monitoring, FY 2001

Monitoring was completed during FY 2001 in Hoonah in response to the findings and recommended corrective action from the IDT trip to Hoonah in FY 2000. The following excerpt from the Hoonah IDT trip report that was included in the FY 2000 Tongass Monitoring and Evaluation report is included for reference with applicable corrective action notations.

> 10 Percent IDT Best Management Practices Monitoring Trip: Hoonah
>
> A field trip to the Hoonah Ranger District, on August 22-23, 2000, was conducted as a part of the annual interagency Best Management Practices (BMP) Implementation/Effectiveness Monitoring effort. The purpose behind the Hoonah visit was to inspect culvert replacements to determine if the BMP was implemented correctly, and to determine the effectiveness of the BMP, as applied in a given instance.
>
> Background
>
> A 1996 Regional Office activity review of Hoonah District system roads identified the need for further study on the effects of culvert design and maintenance on upstream migration. A monitoring project, funded through the Environmental Protection Agency, was initiated in 1997. The objectives of the monitoring project were: Identify physical conditions that impede fish migration at Class I and Class II stream crossings; sample fish above and below stream crossings and estimate area of potential habitat loss associated with road-related migration barriers; and identify maintenance needs and opportunities for restoring access to fish habitat.

The objectives also should have included estimation of area of enhanced habitat created.

> Sampling was focused on road segments identified in previous surveys as having significant numbers of culverts that restrict upstream fish migration. These included segments of road in the Game Creek, Freshwater Creek, Iyouktug Creek and Pavlof River watersheds on Northwest Chichagof. A summary of the procedures and findings, titled *Fish Passage at Selected Culverts Crossings on the Hoonah District Road System*, was compiled by Chris Riley and Steve Paustian (3/99).
>
> There were 32 stream crossings identified as potential barriers to fish migration. Of these, 13 were identified as Class I streams; all 13 were determined to present actual barriers to movement by adult and/or juvenile anadromous fish. The remaining 19 streams were classified as Class II (containing resident fish)...
>
> In 1998, plans were made to replace the culverts identified as fish barriers during the field survey. A contract was prepared using the BMPs, Forest Plan Standards and Guidelines, and stream crossing construction specifications applicable at the time. The contract period was set to coincide with the “fish window” of June 1 – July 15. ADF&G was consulted, conforming to the conditions of the March 1998 Memorandum of Understanding on in-stream work.

No analysis of existing potential fish habitat was preformed. Species were not identified as part of the preconstruction analysis. If these structures were designed following current design protocol, a habitat investigation would have been conducted prior to design.

> The work under the contract involved removing the existing culvert, replacing it…, and assuring that it was installed to provide fish passage for adults and juvenals. To date, 39 culverts have been replaced under two different contracts, with work occurring in 1998, 1999, and 2000. Work has occurred in the Game Creek, Freshwater Creek, Iyouktug Creek, Pavlof River, and Neka River watersheds. Priorities were the … barriers identified in the study, and … culverts identified in subsequent surveys.

Implementation Monitoring Results

The purpose of the monitoring trip was to look at replacement culverts on the existing road systems. The applicable Best Management Practices were 14.6 – Timing Restrictions for Construction Activities, and 14.14/14.17 – Bridge/Culvert Design, Installation & Removal. The original culvert locations were determined during the initial road construction. The location was on what had been determined to be the break between Class I or II stream reaches, and the beginning of the Class III segments. This may or may not have been accurate.

An analysis was to be identified during the preconstruction phase of the project. This analysis should have been preformed to determine if these terrestrial conditions were present at the time of initial design survey and also at the time of the IDT review.

Several of the culverts had been replaced over the life of the road; however, these replacement pipes did not meet the current criteria of allowing fish passage or for sizing.

The team looked at a total of 20 culvert replacements on four road systems in three large watersheds on the Hoonah District. The 20 culverts inspected represented 51 percent of all culverts replaced on the Hoonah road systems; the remaining 19 culverts were on Hoonah road systems that were deemed impractical to access in the time allotted. A complete stream survey was completed on one site (FDR 8508, KP 20.10). The results of this survey will be available at a later date.

Of the 20 culverts investigated on the Hoonah District, two had departures from full BMP implementation, and required …action. In addition, three others were installed in compliance with the BMP, but may require some additional work... The major problem encountered during the 1999 work season was the presence of abnormally high water flows. A combination of heavy snow accumulation, late snowmelt, and heavy rains caused higher-than-normal runoff and stream flow during the “fish window” (June 1 – July 15). Removal of the culverts and the leveling (or bedding) resulted in …in the washing out of the soil. This was a particular problem where the streambed was of alluvial origin, and in areas of very shallow bedrock... While it was recognized at the time as a problem, it was felt best to proceed during the “fish window,” rather than to wait and possibly extend outside the window period.

Reviewing these 20 culverts, four had minor discrepancies associated with the BMP implementation and appeared to the IDT to need some further action. Three others were installed in full compliance with the BMPs but may need some other work to prevent future problems. The culverts are hydraulically functioning without failures. A proposal was made to request variances on the fish-timing window. A contract cannot be issued under these types of conditions; it would be impossible for a contractor to bid in this type of situation. This problem may occur next year; the subsequent annual delays are not economically sound or biddable.

A second problem encountered was the use of “typical” installation designs where the site situation was atypical (shallow bedrock, steeper gradients, stream course shifting, differing stream gradient resulting from culvert removal, etc.).

Parameters need to be in place for what constitutes a typical terrestrial, hydraulic, and habitat scenario. Through defining these parameters, standardization would be possible.

In general, it was found that the replacement pipes were of the proper size for the stream width; there was good application of rock weirs for outlet control; culvert bedding was good, except in the case of six-percent-plus alluvial channels …and timing of in-stream work conformed to the “fish window.” In the last case, the BMP for timing was met, but high flows in June 1999 exacerbated erosion …causing non-compliance with BMPs 14.14 and 14.17. Sites where problems were identified, or it was determined that some follow-up was desired, will be revisited in the spring of 2001.

If one examines the mathematics of these types of culvert placements, it can be found that head cutting or a falls at the outlet is unavoidable. Although timing requirements were met in accordance with the "fish window", the high flows in June 1999 hindered meeting construction specifications. These high flows probably caused the non-compliance with BMPs 14.14 and 14.17. A need for identification of lost habitat, the extent of the loss of habitat, any improvement in habitat area, and calculations of area involved is identified. These items should be considered during the preconstruction phase of the project. Methods or techniques to improve fish habitat also need to be addressed.

The table included below lists the culverts where concerns were identified, and the departure from BMP implementation or problem identified with the installation. This table was modified from the original text printed last year in response to the findings of the investigation conducted in FY 2001. In all of the following pipes, no discussion of fish habitat, timing or passage occurs. Any discussion of typical versus non-typical should include the above information.

Table C-1. Culverts of Concern

Culvert Number	Departure/Problem	Further Action
Rd 8505, kp 20.90	Tried to implement a "typical" design on an "atypical" site. The culvert was placed in accordance with the BMP/S&Gs. The original culvert was placed on the stream gradient (about 5%). The replacement culvert was placed on bedrock at about a 2% gradient. Upstream cutting resulted in a 1-foot head wall.	Further action includes placing boulders downstream to provide pool habitat, and placing rocks and gravel in the pipe to increase roughness and facilitate natural filling.
Rd 8508, kp between 21.08 and 22.46	There was some head cutting some 25 feet upstream of the culvert. Some bank cutting to one side of the culvert occurred.	It is believed the situation is self -correcting; however, inspection will be made in 2001, and if the stream has not self-corrected, remedial actions should be taken to prevent further erosion.
Rd 8513, kp 0.59	Shallow bedrock was not anticipated; this resulted in a culvert on a 4% gradient, rather than <1%. Upstream cutting occurred after culvert replacement, causing a short, steep stretch, cut to bedrock. Had this culvert been installed at less that 1% this situation would have been extenuated.	Further action is rock placement in the culvert to increase roughness, encouraging and enhancing gravel fill-in of the culvert. This situation was not accounted for during preconstruction. Appropriate design changes might have been necessary.
Rd 8513, kp 1.52	S&Gs in place at the time of contract prep, lead to the use of a standard design and specification. These guidelines were met during culvert replacement. The stream was a steeper gradient, alluvial channel. This condition was not anticipated during preconstruction and created several long-term maintenance problems and did not lend itself to a "typical" installation.	Further action includes boulder placement at the outlet to create a pool. Rip Rap should be placed at the inlet end to prevent any bank erosion. Relief of the headwall caused by upstream cutting should be self-correcting over time. Additional placement of rocks and gravel in the pipe to increase the substrate may be necessary.

Culvert Number	Departure/Problem	Further Action
Rd 8513, kp 2.33	The culvert was aligned with what was thought to be the main channel at the time. The original stream rerouted into the second channel during the winter. This resulted in a culvert that was not directly aligned with the stream. The stream now enters the culvert at an angle. This is causing cutting of materials from the road fill around the pipe, and from the adjoining stream bank. The bedload is filling in the constructed pools downstream.	Further actions include the riprapping of the fill slope and stream bank. Large riprap should be placed upstream to help to divert the stream into the culvert. Reconstruction of the downstream pools, by placement of large riprap, needs to occur.
Rd 8534, kp Culvert #3	The culvert was placed in accordance with the BMP/S&Gs, Post-installation washing of the alluvial soils downstream has occurred.	Step-pool construction downstream would help alleviate washing of alluvial soils.
Rd 8534, kp Culvert #2	Washing of alluvial soils after the original culvert was removed and the replacement culvert installed resulted in the streambed being approximately 3 feet lower than the original streambed location. This resulted in upstream cutting, leaving a 1+-foot headwall barrier.	Because of the streambed material, it is believed the barrier will be self-correcting. If the barrier does not self correct in 1-2 years, action will be taken to "smooth out" the barrier manually.

Appendix D

Fish, Riparian and Aquatic Synthesis

Riparian and Aquatic Synthesis Summary

The Forest Plan monitoring plan includes three fish questions, four soil and water questions, and two wetland questions. In addition, other resources' (transportation, minerals, timber, karst, etc) monitoring questions have elements that obviously overlap these questions. In consultation with an Interagency Monitoring and Evaluation Group (IMEG) and with the support of the Juneau Forestry Sciences Laboratory, over a dozen fish, soil, stream, riparian and wetland monitoring protocols have been proposed. Some of the protocols are fully developed and have been tested since 1997. In 1999, IMEG recommended an effort to integrate these protocols. A Forest hydrologist is responsible for coordinating the Riparian and Aquatic Synthesis.

A draft study plan for the *Riparian and Aquatic Synthesis* of *Forest Plan Monitoring and Case Study Watersheds* has been routed for review and comment. Comments are currently being compiled for IMEG consideration. The Riparian and Aquatic Synthesis will integrate the full array of Forest Plan aquatic monitoring efforts in both spatial and temporal frames. An overall strategy will document statistical design as well as practical considerations as appropriate. A suite of response indicators will be measured across the Tongass. These indicators will represent baseline or reference conditions and ecological classification units at the landscape and stream reach scale. Case study watersheds will provide short- and long-term watershed context to improve our understanding of aquatic response to both natural and human-caused disturbance processes. Communication links to decision-making will be supported across a continuum of time scales, from instantaneous corrective actions during project implementation to decadal or longer cycles associated with Forest Plan revisions. The final study plan will also recommend quality assurance and data management procedures.

The synthesis will address implementation monitoring, effectiveness monitoring, and validation monitoring. The emphasis is on developing and integrating effectiveness monitoring protocols that will be applied within case study watersheds. A case study watershed approach is proposed as a long-term paired watershed study. Several potential sets of case study watersheds have been identified. Each set includes three watersheds: two treatment watersheds with future harvest plans (one with no existing harvest/roads, one with a relatively high level of existing harvest/roads) and one control watershed with no existing harvest/roads and no future harvest/road plans. The Treatment 1 watershed will provide a “clean slate” for monitoring the implementation and effectiveness of the current Forest Plan Standards and Guidelines. The Treatment 2 watershed will provide data to evaluate cumulative watershed effects resulting from past management, as well as some indicators of trends associated with future management (including restoration).

In 2002, field verification efforts will establish the suitability of the proposed watershed sets for existing monitoring protocols. IMEG will participate in the selection of the best case study watershed sets and long-term funding will be pursued for implementation (including installation of stream gauges and supporting instrumentation) beginning in 2003.

The following table displays the current status (April 2002) of the riparian and aquatic monitoring protocols with respect to the original Forest Plan monitoring questions. Several of the monitoring protocols are considered complete: sites have been established and data has been collected. An effort is underway to evaluate the three stream reach monitoring protocols (resident fish, buffer effectiveness, and channel condition assessment) and ensure that data is collected according to protocols established in the Alaska Region Aquatic Habitat Management Handbook (November 2001). Further information on the progress of the riparian and aquatic synthesis can be obtained by contacting the Tongass National Forest. Funding has been designated for continued work on all of the protocols currently under development. IMEG will continue to participate in the development and refinement of all monitoring protocols.

Table D-1. Fish, Riparian and Aquatic Synthesis, Tongass Land and Resource Management Plan, April 2002

Monitoring Question	Evaluation Criteria	Sampling Methods	Scale	Data Collection Protocol Document Status
Fish Habitat				
A. Are population trends for Management Indicator Species (MIS) and their relationship to habitat changes consistent with expectations?	**1. Pink salmon:** escapement trends	First step will evaluate historical escapement data	Where available (Tongass-wide), case-study watersheds if available	In progress
	2. Coho salmon: **habitat changes and population trends**	Habitat survey and population sampling (first step will identify response variables)	Implement in case-study watersheds	In progress
	3. Resident cutthroat and Dolly Varden char: habitat changes and population trends	Habitat survey and three pass removal sampling at designated treatment and control sites pre- and post-harvest	22 existing sites, Tongass-wide, implement in case study watersheds if possible	Complete 28 Feb 2000
B. Are Fish and Riparian Standards and Guidelines being implemented?	**1. Compliance with Best Management Practices** (focus on fish streams and riparian areas)	100% timber and road BMP implementation monitoring, 10% quality check	All timber and road projects, including case study watersheds	Complete (June 2001)
C. Are Fish and Riparian Standards and Guidelines effective in maintaining or improving fish habitat?	**1. Buffer stability:** windthrow in no-harvest buffers	Low altitude digital still aerial photography	All timber projects, including case study watersheds	Complete (M&E Guidebook, June 2000)
	2. Buffer effectiveness: changes in riparian function, channel morphology, and fish habitat features	Channel morphology and habitat survey	7 existing sites	Complete (M&E Guidebook, June 2000, Appendix)
	3. Channel condition assessment: changes in channel morphology and fish habitat features	Channel morphology and habitat survey	69 existing sites, Tongass-wide, implement in case study watersheds	Complete **[8 Feb 2000] 11 Dec 2000**
	4. Fish passage through culverts	Road condition survey	All roads, including case study watersheds	Complete **(M&E Guidebook, June 2000)**
Soil and Water				
D. Are the standards and guidelines for soil disturbance being implemented?	**1. Compliance with Best Management Practices** (focus on unstable slopes)	100% timber and road BMP implementation monitoring, 10% quality check	All timber and road projects, including case study watersheds	Complete **(June 2001)**

Monitoring Question	Evaluation Criteria	Sampling Methods	Scale	Data Collection Protocol Document Status
E. Are the standards and guidelines effective in meeting Alaska Regional Soil Quality Standards?	**1. Compliance with Soil Quality Standards for disturbance**	FY2000 Monitoring and Evaluation Report results do not indicate need for further monitoring	Not applicable	Not applicable – monitoring question has been answered at Forest Plan level
	2. Landslide inventory and assessment: changes in frequency of landslides	Field surveys conducted pre- and post-harvest	Implement in case study watersheds and resident fish MIS (A3) watersheds	In progress
F. Are Best Management Practices being implemented?	**1. Compliance with Best Management Practices**	100% timber and road BMP implementation monitoring, 10% quality check	All timber and road projects, including case study watersheds	Complete **(June 2001)**
G. Are Best Management Practices effective in meeting water quality standards?	**1. Compliance with Alaska State Water Quality Standards:** stream turbidity and stream temperature criteria	Turbidity measured up and downstream of major drainage structures after installation. Stream temperature measured at legacy sites with fish kill concerns	Turbidity as applicable on all road projects, stream temperature in Southern Tongass, both considered in case study watersheds	Turbidity - complete (revisions considered for 2002) **(M&E Guidebook, June 2000, Transportation)** Temperature – in progress
	2. Protection of aquatic life as designated beneficial use: Refer to protocols described for C2 and C3	Refer to protocols described for C2 and C3	Refer to protocols described for C2 and C3	Refer to protocols described for C2 and C3
Wetlands				
H. Are Wetlands Standards and Guidelines being implemented?	1. Avoidance of wetlands during timber harvest and road construction	Evaluation of GIS layers	All timber and road projects, including case study watersheds	Complete (M&E Guidebook, June 2000)
	2. Compliance with Best Management Practices (focus on wetlands)	100% timber and road BMP implementation monitoring, 10% quality check	All timber and road projects, including case study watersheds	Complete (June 2001)
I. Are Wetlands Standards and Guidelines minimizing the impacts to wetlands and their associated functions and values?	1. Vegetation: changes in vegetation species	Glaser study	Selected sites Tongass-wide	In progress
	2. Soil/Slope Hydrology: ??	D'Amore study	Implement in case study watersheds	In progress
	3. Surface/Subsurface flow: interception of groundwater	McGee study	Implement in case study watersheds	In progress

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Appendix E

Fish Passage Sites, FY 2001

Revised List of Fish Passage Project Sites Planned for FY02

Table E-1. Prince of Wales Fish Culvert Design, sites, Prince of Wales Island

RTE_NO[1]	MP[2]	New Pipe Size[3]	Length[4]	CHT[5]	AHMU[6]
2054000	2.22	81x59	40	MM	2
2054000	3.56	72"	36	MM	1
2054000	3.78	72"	42	PA	1
2054300	0.46	40Ft slab	40	FP	1
3000000	48.34	District substitute			
3000000	52.24	District substitute			
3000000	60.55	15'x10' btmless or sppa	66	MM	1
3000000	60.67	60"	32	MM	1
3000000	61.68	103x71	58	MM	1
3000000	62.43	132" btmless arch	68	HC	1
3000000	62.52	15'x10' sppa	70	MM	1
3000000	64.88	15'x10' sppa	50	MM	1
3000340	1.65	40Ft slab	40	HC3	2
3030850	0.27	20ft slab	20	PA	1
3030850	0.3	60"	34		2
3030850	0.48	60"	34		2

Table E-2. Portage Bay Fish Culvert Design Sites, Kupreanof Island

RTE_NO	MP	New Pipe Size	Length	CHT	AHMU
6031	0.583	48"	44	PA_PA	1_1
6031	0.597	72"	64	PA_MM	1_1
6031	3.161	30' slab bridge	30	MC_MC	1_1
6031	3.833	95x67	40	MM_MM	1_1
6031	4.34	95x67	42	MM_MM	2_2
6031	5.84	117x79	44	MM_MM	1_1
6031	6.166	retrofit with weir		MM_MM	1_1
6031	6.631	btmless arch 72"	40	HC_HC	1_1
6032	0.859	128x83	84	HC_MM	1_1
6317	0.043	78"	64	MM_MM	1_1
6317	2.112	120" btmless arch	48	HC_MM	2_2
6317	5.699	72" btmless arch	34	HC_HC	2_2
6317	5.88	72"	34	HC_HC	3_2
6319	0.872	District Substitute			
6319	8.413	78"	36	MM_MM	2_2
6319	10.975	60"	38	HC_HC	2_2
6323	0.162	72"	56	PA_MM	2_2

[1] RTE_NO – This is the Forest Service Road Number.
[2] MP – This is the milepost where the pipe will be located.
[3] New Pipe Size – This is an estimate of the size pipe needed for that location.
[4] Length – This is the length of pipe needed in feet.
[5] CHT – Channel type of the stream at the pipe location. For example, FP denotes a flood plain channel type.
[6] AHMU – This is the Aquatic Habitat Management Unit class: a Class 1 has anadromous and resident fish a Class 2 has resident fish, Class 3 and 4 have no fish. In the document, these classes are listed as Class I, II, III, and IV.

Table E-3. Salt Lake Bay Fish Culvert Design Sites, Chichagof Island

RTE_NO	MP	New Pipe Size	Length	CHT	AHMU
8578	0.1	District substitute			
8578	0.219	72"	34	HC	2
8578	0.608	72"btmless arch	38	HC2	2
8578	0.887	84"btmless/20ft slab	20	HC2	2
8578	0.928	95x67	34	HC2	2
8578	0.958	48"with weirs	34	HC	4
8578	1.203	60"	44	MM	2
8578	2.36	48"	34	MM	2
8578	2.445	15ft slab	15	MM	2
8578	2.906	96" btmless arch	44	HC2	2
8578	3.02	60"	40	HC2	2
8578	3.168	48 weirs	42	HC	2
8578	3.218	96" btmless arch	44	HC	2
8578	3.342	78" btmless arch	38	HC2	2
8578	3.386	20ft slab	20	HC2	2
8578	3.511	20ft slab	20	HC2	2
8578	3.532	20ft slab	20	HC	2
8578	3.764	73x55	38	MM	2

Table E-4. Kuiu Island Culvert Design and Construction

RTE_NO	MP	New Pipe Size	Length (ft)
6402	7.87	95X67	44
6402	11.17	87X63	68
6407	0.12	120"btmless	42
6407	1.2	144"btmless	100
6407	1.74	60"	40
6407	2.73	48"	34
6407	4.53	60"	40
6407	4.56	retrofit	
6407	6.21	60"	34
6415	12.73	60"	42
6420	2.1	retrofit	

Table E-5. Mitkof Island Fish Passage Improvements

RTE_NO	MP	New Pipe Size	Length (FT)
6204	1.997	95"X67"	44
6204	3.579	95X67	44
6204	5.895	72"	44
6204	6.092	72"	40
6204	8.002	103"X71"	46
6212	0.106	substitute	
6212	0.708	substitute	
6235	0.190	72"	44
6235	12.361	95"X67"	50
6235	12.932	72"	76
6235	15.450	95"X67"	40
6235	15.846	128"X83"	38
6235	17.071	87"X63"	40
6235	17.334	SLAB BRIDGE	25
6235	17.579	72"	38
6245	1.256	72"BOTTOMLESS	54
6245	1.503	128"X83"	40
6245	4.690	84"	54
6245	4.962	72"	40
6245	8.562	72"	44
40000	2.492	substitute	
40000	3.129	60"	44
40000	3.194	112"X75'	54
40000	3.292	60"	40
40000	3.337	96" BOTTOMLESS	54
40000	3.356	142"X91"	44
40000	3.552	72" WITH WEIRS	44
40000	3.739	78" WITH WEIRS	40
40000	5.001	87"X63"	40

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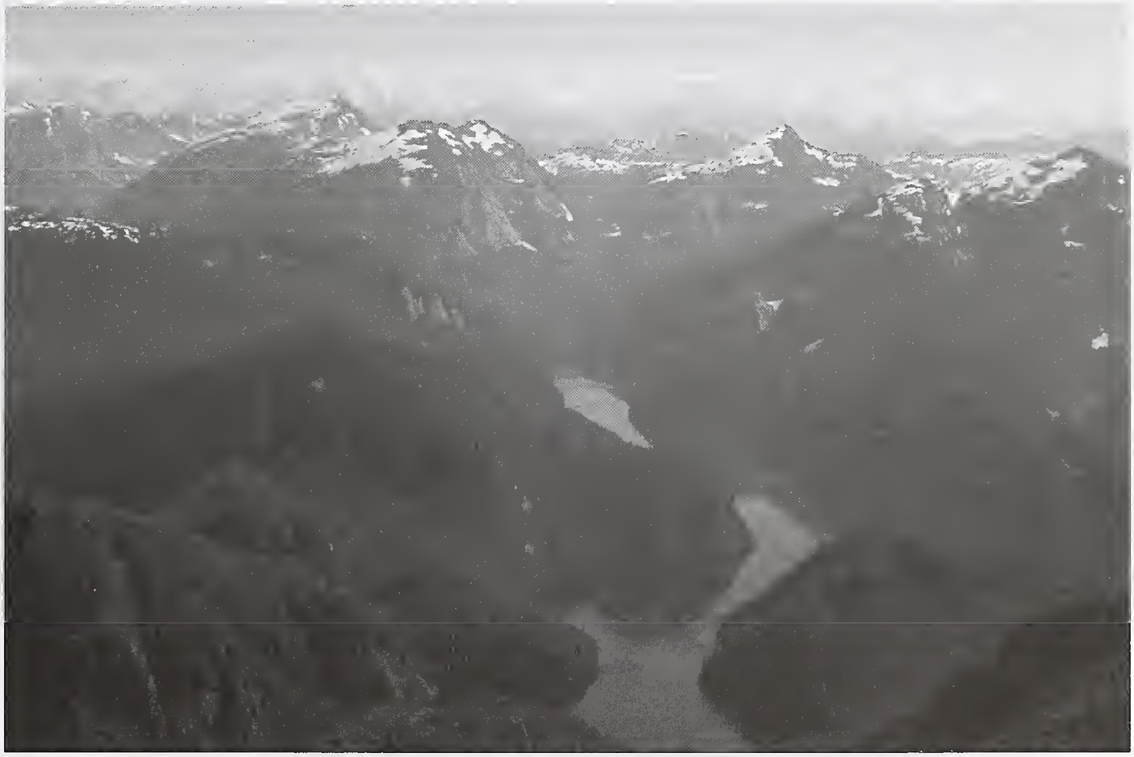
Appendix F

Misty Fiords National Monument Recreation Use Project



Misty Fiords National Monument

Pilot: Misty Recreation Use Project

A pilot project to examine the impacts of recreation visitation on wildlife in the Misty Fiords National Monument was initiated 2001 to be completed in 2002. This is a cooperative project between the FWS, the Tongass National Forest and the School of Renewable Natural Resources, University of Arizona.

A recognized need for monitoring interactions with visitors on wildlife was identified. In response to this need, a pilot study was initiated in Misty Fiords National Monument. Up to this point, minimal work has been undertaken to inventory and monitor the impacts of increased recreation use in the Tongass and in particular the Misty Fiords National Monument Wilderness. Aside from annual outfitter/guide performance reports submitted to the FS, virtually no baseline inventory on existing conditions was documented in a systematic way. While cruise ships, floatplane tours, commercial and recreation hunting/fishing and kayak trips all converge in well known places, such as the Rudyerd Bay, little is known as to the volume of each use, possible conflicts between and within activities and their impacts on wildlife and wilderness values. Being accessible only by air or water, Misty Fiords National Monument makes it difficult to assess current use patterns using conventional social inventory methodologies, let alone establish a monitoring program to examine impacts of increased use on the Monument and associated impacts on resident wildlife.

A methodology for examining the spatial/temporal patterns of commercial and non-commercial use, revealing where they go, how long they spend and to what degree they impact each other and in particular the seasonal patterns of wildlife occupancy is needed. The purpose of this study is to utilize existing data from commercial hunting/fishing permits, cruise ship schedules, known and predicted wildlife locations and other sources to simulate recreation use in the Monument. The Fish and Wildlife Service and Tongass National Forest will work with University of Arizona to explore the use of the data and computer simulation to understand recreation impacts on fish and wildlife populations in Southeast Alaska.

This study has been divided into the following two phases:

First, the Forest Service will acquire information (listed below) in conjunction with the University of Arizona that will be used to simulate visitation patterns. This data will consist of records from cruise ship tours, commercial fishing/hunting records, harbor master records, floatplane tours and various other sources. Information identified as critical to understanding the spatial/temporal patterns of use include: type of activity, company, number of visitors on tour, duration of visit, time of departure/arrival, estimated time of arrival and destinations. Flight plans from floatplane operations and preferred routes cruise ships use to get to destinations is imperative. In addition to the collected data, interviews will be conducted with knowledgeable FS staff on outfitter/guide patterns of use, ship captains, etc., to get at underlying decisions made regarding destination visits. This information will be gathered using maps to draw typical flight patterns, stops, etc.

Second, conventional methods used in the planning and management of recreation settings have focused on the use of user surveys and traffic counts to estimate the requirements. However these methods fall far short of the real needs of managers who need to comprehensively evaluate the cascading effects of the flow of visitors through a sequence of sites and estimating the effects of increasing visitor flows through time. Crowding, conflicts between different recreation modes, impacts on environments and seasonal effects such as day length and weather are all factors recreation planners and managers must consider for long term planning and management of natural settings. Consequently, this pilot project will utilize RBSim, a computer program that allows resource managers to examine current spatial/temporal visitor use patterns and explore their interaction with other resources such as wildlife management. In addition, consequences of change to any one or more variables can be examined so that the goal of accommodating increasing visitor use is achieved while maintaining the quality of visitor experience with minimal impact on the natural resource. RBSim provides both a qualitative understanding of management scenarios by the use of map graphics from a Geographic Information Systems (GIS) as well as a

quantitative understanding of current conditions and management consequences by generating statistics during the simulation. Managers will be able to identify points of over crowding, convergence of differing recreation activities in circulation systems, areas of interaction with sensitive wildlife species and conflicts between different user groups.

For this study, RBSim will be used to create a model that simulates floatplane operations, cruise ship tours, kayak and outfitter/guide trips into Misty Fiords National Monument during the 2000 season. In addition, wildlife telemetry data and areas generated from the FWS wildlife models will be combined into the simulation to identify areas of concern related to human/wildlife interactions.

This research will address the following questions:

- Where and to what degree are visitors currently using Misty Fiords National Monument?
- What are the peak visitation periods?
- What seasonal time periods are sensitive in terms of human interactions on wildlife populations in Misty Fiords National Monument?
- Where and to what degree are visitors encroaching/impacting wildlife in Misty Fiords National Monument?

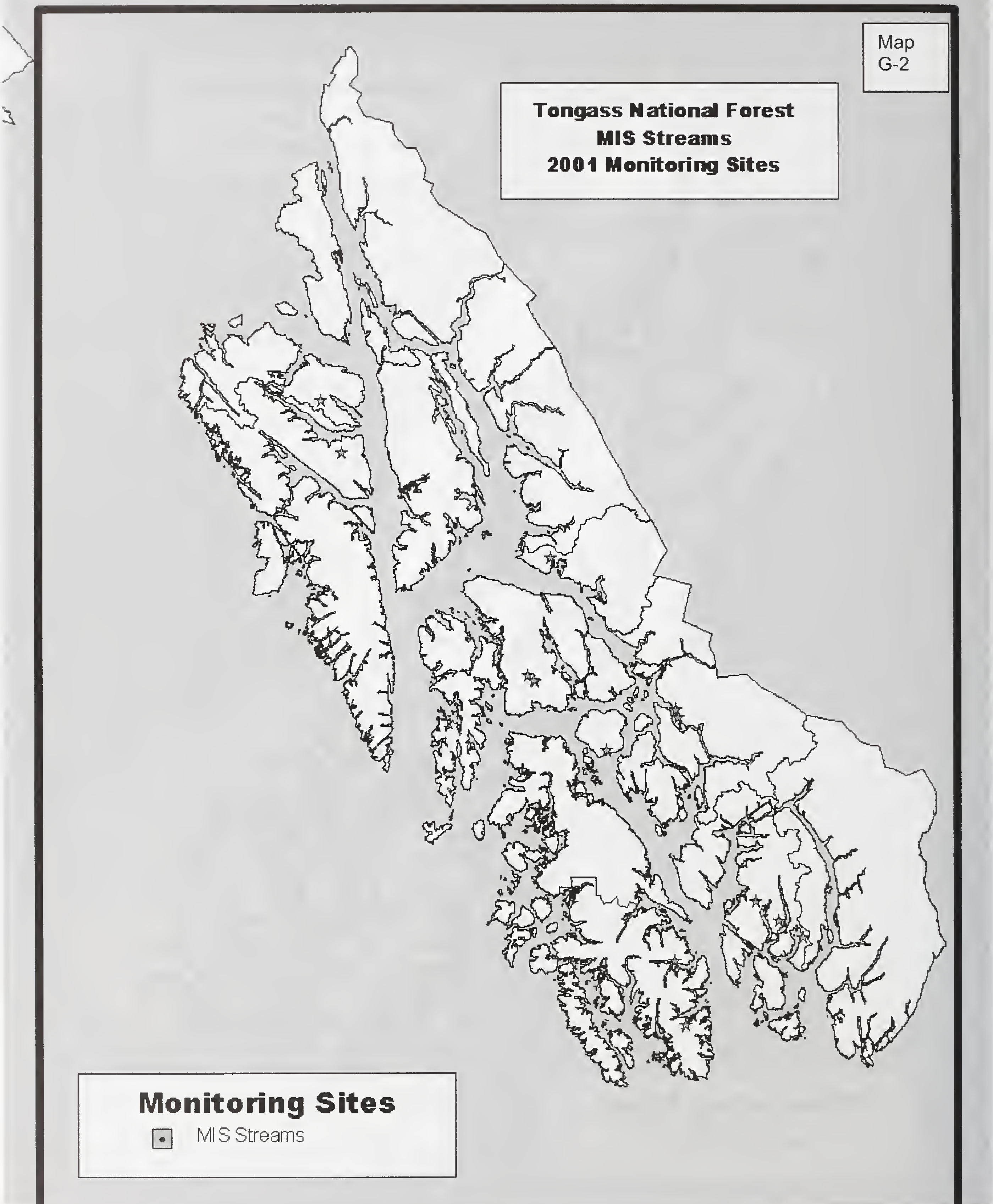
The simulation environment created for Misty Fiords National Monument will consist of a network designer for building and editing networks that agents will traverse; an agent designer for building agents; a scheduler that is used to supply the simulation with information on how agents will traverse the network, summary statistics (generally time series data on use patterns) and a scenario builder that managers can manipulate to explore alternatives.

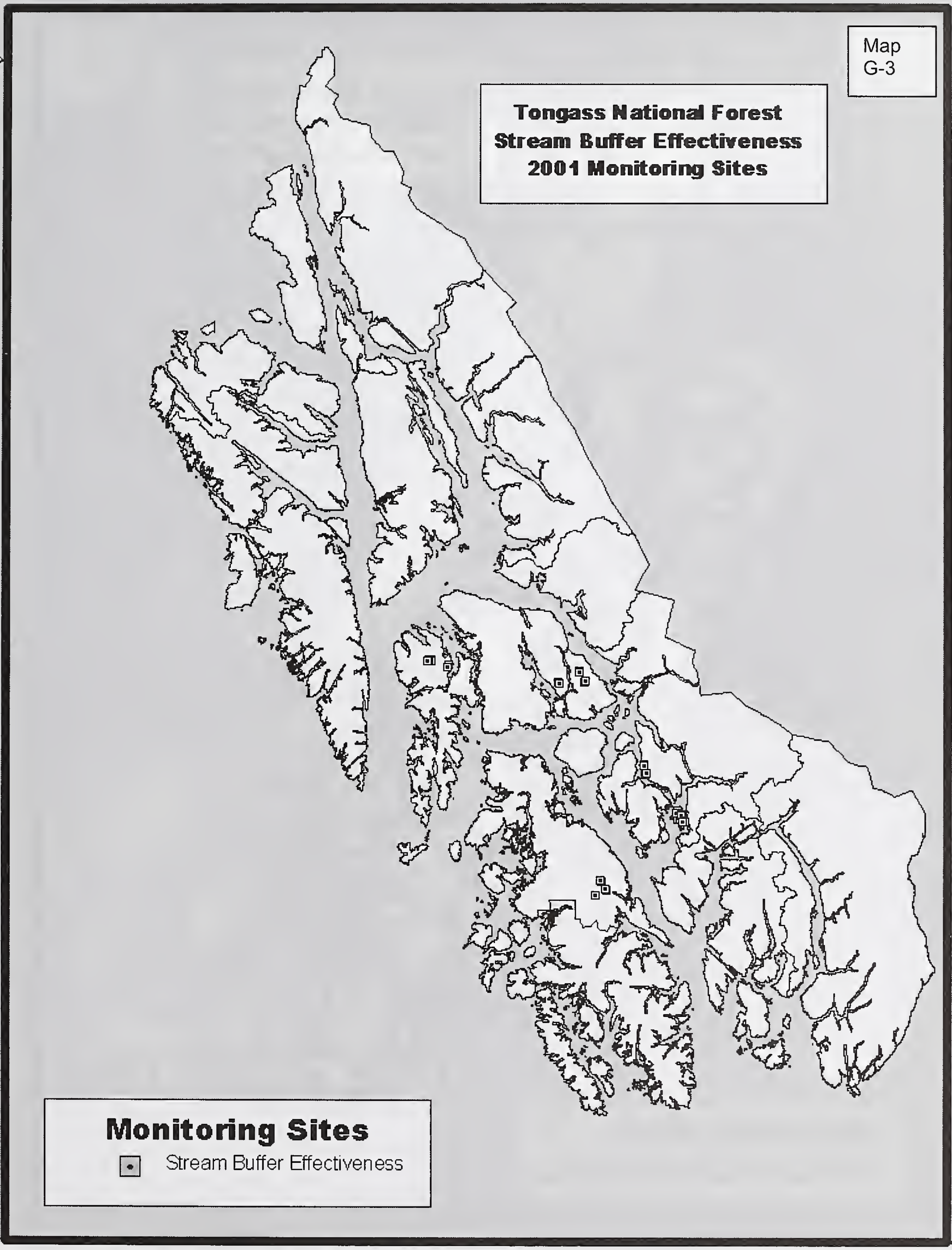
The outcome from this work will be an integrated simulation system for exploring visitor use patterns in Misty Fiords National Monument. The scenario builder will allow the managers to explore alternative scenarios and the summaries will provide a variety of statistical queries on the data, linked to output functions for easy viewing and interpretation. Also, GIS themes containing explicit maps identifying the spatial location of visitor use patterns and intensity of use at destinations will be available.

Appendix G

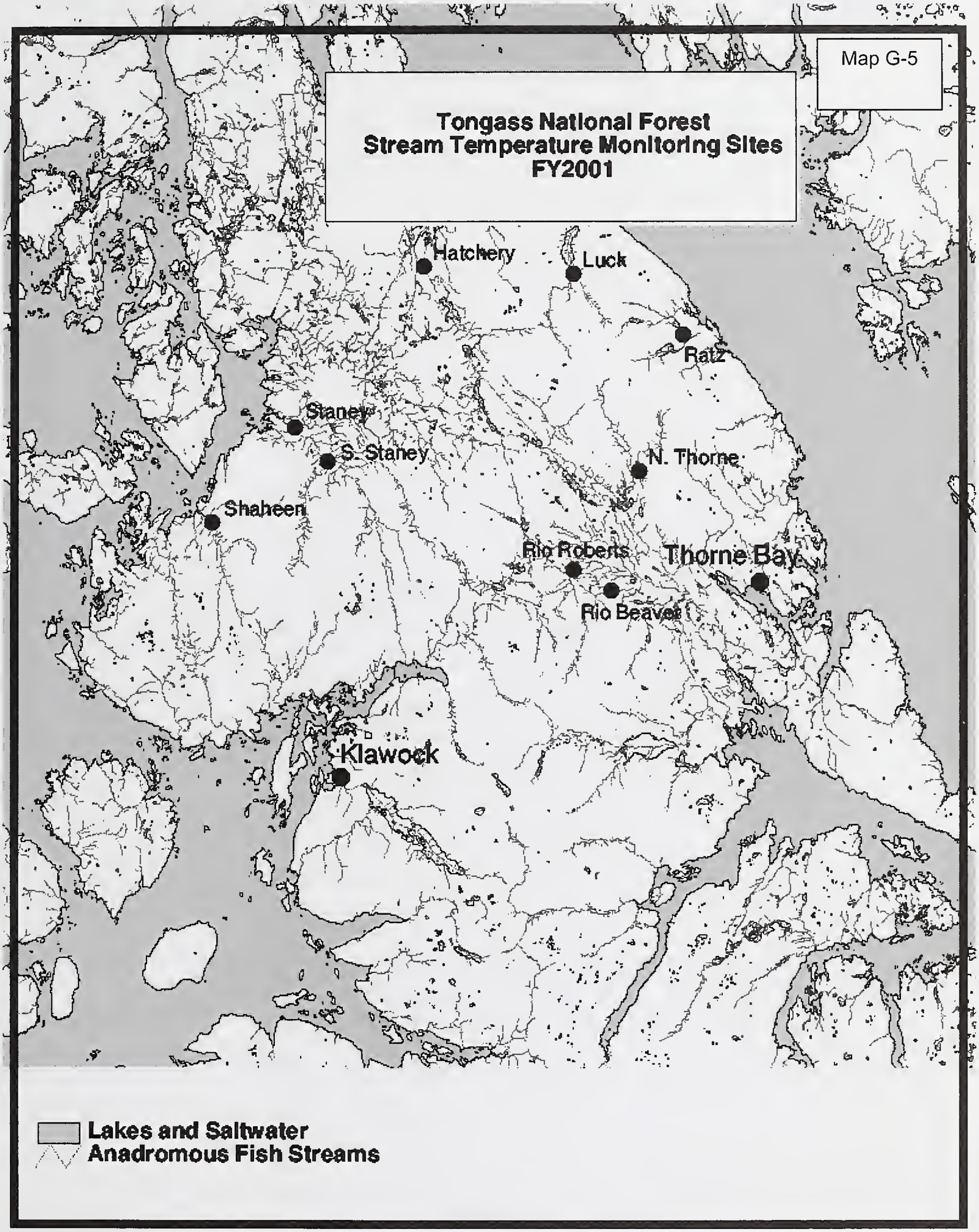
Maps


Map
G-1
Tongass National Forest
Heritage
2001 Monitoring Sites
Monitoring Sites
Heritage 2001 Sites


Map
G-2
Tongass National Forest
MIS Streams
2001 Monitoring Sites
Monitoring Sites
MIS Streams


Map
G-3
Tongass National Forest
Stream Buffer Effectiveness
2001 Monitoring Sites
Monitoring Sites
Stream Buffer Effectiveness


Map
G-4
Tongass National Forest
Stream Buffer Stability
2001 Monitoring Sites
Monitoring Sites
Stream Buffer Stability 2001 Sites


Map G-5
Tongass National Forest
Stream Temperature Monitoring Sites
FY2001
Hatchery
Luck
Ratz
Staney
S. Staney
N. Thorne
Shaheen
Rio Roberts
Thorne Bay
Rio Beaver
Klawock
Lakes and Saltwater
Anadromous Fish Streams

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